# An Investigation into the Effect that Technology had on the Strategies of J. Sainsbury plc, Tesco plc and Safeway plc: With a Particular Focus on the Period 1980 to 1990

Thesis

UNRESTRICTED

**An Investigation into the Effect that Technology had on the Strategies of J. Sainsbury plc, Tesco plc and Safeway plc: With a Particular Focus on the Period 1980 to 1990**

by

Chris Morgan

MA (Warwick), DMS (Lanchester Polytechnic)

Wh. Ex., M.I.Mgt., M.B.C.S.

Submitted for the degree of Doctor of Philosophy

at the Open University, Department of Technology

Date of submission: 22nd January 1998

Date of award: 22nd July 1998

*Abstract*

This research is focused on three food multiple retailers, Sainsbury plc, Tesco plc, and Safeway plc. The research is designed to explore the relationship between technology and strategy in these organisations. The currently held view among the researchers and managers of these organisations is that technology has a limited impact on the processes that formulate strategy, and as such may be regarded as having an enabling role. This thesis proposes that while this view may have been correct in the past it is so no longer, and that technology is not following strategy but leading strategy in the food retailers examined.

In order to confirm this thesis the history, technical development and technical structure of the three retailers was investigated. The results of this research was subsequently analysed and the following conclusions were made:

a. Technology has a much greater impact on the strategy of multiple food retailers than has been previously thought. Technology defines the boundaries of operational activities, and, through controlling a substantial proportion of the information that managers use in the strategy making process, technology de facto if not de jure greatly influences the retailers strategies, and in some cases may actually lead them.

b. The food multiples, in not appreciating the extent to which their fate is tied up with the information technology they are using, are failing to educate and train the general management of the organisations technologically.

c. Technological progress is widening the gap between the general management and technical management, and in the long run this will cause serious strategic problems unless this gap is closed through positive action.

### *Acknowledgements*

I would like to begin by thanking the organisations who co-operated by supplying information. Without this information this thesis could not have been completed. I must also thank those individuals within the organisations who agreed to be interviewed and who shared so much of their valuable time imparting insights that added greatly to my understanding of the multiple retailing environment.

I thank my supervisor Dr. John Hughes who has given enthusiastic support and guidance throughout the process of completing my research and writing this thesis. His skilful help has made the journey seem shorter, his discussions inspirational, his patience a monument to the best of academic traditions.

My family deserve my thanks as they have been long suffering during the past five years. In particular I must thank my wife Pamela who has never complained when research and writing has interfered with family activities.

I also thank Mrs. Diane Hayes, Mr. Paul Brown and Mr. Ian Books of the Faculty of Management at University College Northampton whose support has been invaluable.

Finally I thank all of those other people, too numerous to mention individually, who have contributed directly or indirectly to this thesis.

*Contents*

*Table of Contents*

## *Table of Figures*

*Table of Tables*

# *Chapter 1*

## *Introduction to the thesis and to the United Kingdom retail environment*

### *1.1 General introduction*

At a conceptual level the job of a food retailer is simple. Determine what the customer wants; find a source of supply; negotiate an acceptable price; transport and display the goods; sell the goods at a profit; use the money from the transactions to buy more produce and to pay for running costs. Retained profits are used for dividends, taxes and future investment. As long as these tasks are associated with a small number of stores in a small geographical area, a limited number of product lines, few suppliers and a small distribution system, control can be effected through simple manual systems. Growth in the size and geographical coverage of a food retailer greatly increases the complexity of the control problems. Manual control systems become increasingly ineffective for several reasons:

1. The amount of paperwork to be manually processed increases rapidly (e.g. orders, invoices, stock records and store activity records).
2. The complexities of the supply chain becomes difficult to control.
3. The accurate delivery of produce to multiple outlets from the supply chain becomes difficult to maintain.
4. The location of produce within the supply chain becomes difficult to trace - a key issue for perishable goods.
5. Maintaining an accurate relationship between the buying price and the selling price becomes very difficult and this can threaten the gross margin of the business.
6. Control data required to monitor store and supply chain operational

activities is not available to managers quickly enough.

The food retailer finds the advantages associated with growing in size, for example lower purchase prices gained trough bulk buying, are offset by increases in overhead costs and an overall decline in efficiency. To regain control and improve efficiency most food retailers look to information technology to find answers to their problems. It will be subsequently be demonstrated that a common approach to the early stages of computerisation in food retailing has been to convert individual manual systems such as order processing, stock control and accounting functions. Robson (1994, p.9) suggests that this piecemeal approach can often be attributed to managers of the business needing to learn how to use the computer systems effectively and to trust the system outputs in controlling their business. While these individual control and information systems remain unlinked, it will be shown that they have little effect on strategic decision making, and the computer system installation - usually located centrally in the organisation - remains a support function.

As the retail business grows to regional, national or international proportions, operational pressures associated with the need to improve efficiency increases. These pressures are related to three factors. The first is the need to maintain control of the business as the volume and variety of produce in the supply chain increases. The second is the increasing complexity of the supply chain because of the larger geographical region to be serviced, and the third factor is the need to improve the control of the operational functions in the supply chain and in the individual stores. These three factors eventually combine to make manual control of the individual computer system either inefficient, due to the large number of people needed to process the relevant control paperwork, or ineffective because of the errors to which manual systems are prone. Subsequent food retailing systems integration becomes focused on measuring the performance of the operational aspects of the retailer at all levels, automating and optimising the distribution chain, and on the integration of head office functions. *It is vital that these operational competences are optimised as they form the basis of the competitive strategies of the food multiple retailers in an intensely competitive market place.* Failure to integrate the head office systems would prevent further growth, and it is growth, usually expressed in terms of market share, that is the underlying strategy of most of the large food retailing multiples.

In the food retailers the operational reasons for using information systems has led to the view that technology has an enabling or tactical role in the business of food retailing multiples - a view still widely held by many working and researching the retail environment. This view is typified by Hasty & Rearden (1997, p.39) who comment -

> " (*information*) technology will play a critical role in strengthening ... logistics, improving service levels, direct communication (*with customers and suppliers*), communications and control, eliminating repetitive tasks, handling financial issues."

This view does not suggest that information technology influences retail strategies in any substantive way. ***This research challenges this assumption and seeks to demonstrate that in the case of the multiple food retailers as well as enabling retailing strategies, information technology is now beginning to lead retailing strategies as it transcends the role of processing operational performance data, and moves to providing knowledge upon which management are basing their future strategies.***

In order to achieve this task this research has been structured as follows:

Chapter 1. The remainder of this introduction will discuss the nomenclature of retailing and the development of the general retailing environment between 1980 and 1990 - a period of great information technology change.

Chapter 2 is a review of the strategy, technology-organisation, performance measurement, and distribution literature in order to identify where this research fits in to the established theory and how it makes an original contribution to this theory.

Chapter 3 is a description of the design and implementation of the research programme used to gather quantative and qualitative data associated with the objective of this research.

Chapter 4 is a comprehensive analysis of the information systems currently used by the food multiple retailers in terms of hardware, software and system functionality. This is the first of the results chapters.

Chapter 5 is an analysis of the strategic development of Sainsbury, Tesco and Safeway* that identifies how these food retailers have developed in response to each other and the developing food multiple market place. This information will be used to develop a phase model of food multiple retailer development. This is the second of the results chapters. (* The choice of these companies is explained in Chapter 3.)

Chapter 6 analyses the development of the performance measurement systems throughout the multiple food retailer's organisation in relation to the phase development model defined in Chapter 4. This chapter ties together the development of the operational strategies, the technology systems analysed in Chapter 4, and the strategic systems. This is the third of the results chapters.

Chapter 7 summarises the research and concludes the thesis.

This chapter now continues with a description of the nomenclature associated with the food retailing environment and a review of the main retail market developments during the period 1980 to 1990.

### *1.2 Nomenclature*

Retailing, in common with many other businesses, has developed a nomenclature of its own. The nomenclature relates to the classification of the types of food retailer and to the size of the food retailing outlet. These classifications are widely used within the food retailing business and by the government statistical agencies.

*Independent food retailers* are usually owned by a sole trader and they may or may not be trading as a limited liability company. They are typified by the traditional corner shop offering a limited range of produce, or perhaps the niche market shop that specialised in only one type of product. This category of retailer from both an historic and current point of view has the greatest number of shops. However, these numbers have been in a steady decline each year. Between 1971 and 1992 the numbers reduced by an average of 2.6% per year (from 86,565 in 1971 to 32,662 in 1992 - Table 1.1). During the same period the independent retailers share of the overall market has also dropped from 42.5% to 11.8% (Table 1.1). In characterising the independent retailer Cox and Brittain (1991, p.12) suggest that the advantages that they have are personal relationships with their customers, convenient corner shop locations, flexible merchandising policies, longer opening hours, lower overheads, and sometimes enhanced buying and advertising arranged through membership of voluntary trading groups. These advantages are often offset by intense price competition from the multiple retailers, lack of specialist expertise, lack of expansion capital, being situated away from high volume pedestrian traffic, and, the changing shopping habits associated with out of town shopping centres.

*Multiple retailers* (multiples) are usually joint stock organisations owned by private or public investors. The number of shops that constitutes a multiple is not clearly defined although it is widely accepted that the minimum number is in the order of tens and the maximum number may be hundreds. The multiples that are in the lower range tend to operate locally or regionally, the multiples in the higher range are usually approaching national coverage. (It should be noted that co-operatives are excluded from this category.) The evolution of the multiples is driven by economies of scale. They usually have a strong corporate identity and a highly centralised control and decision making structure. In general the gross profit margin in much retailing (and particularly on food) is low and therefore the multiples tend to concentrate on fast moving produce. Buying is centralised to improve margins through bulk purchasing and corporate image is often promoted through 'own brand' products. This is sometimes carried to the point in non-food multiples where only own brand products are sold, for instance St. Michael as the own brand of Marks & Spencer. The overhead costs associated with running a retail outlet do not increase linearly with size (Table 1.6). This has been an incentive for the multiples to sell their smaller in-town outlets and replace them with larger outlets - often in out of town locations. While sole traders tend to define service in terms of interpersonal relationships, multiples tend to define service in terms of value for money, low prices or one-stop-shopping. As a formula for success the food multiple has worked well. In 1971 multiples had 44.3% of the food market, by 1992 this had risen to 77.8% (Table 1.1). This growth in market share was not accompanied by an increase in the number of stores. In fact they fell from 10,937 in 1971 to 4,577 in 1992. Waterson (1993) explains that although the number of stores declined the average size of individual stores increased - a phenomenon that will be explored later in this chapter.

*Co-operative societies* are the third category of food retailer. They trace their origin to Rochdale when in 1844 the first co-operative (Co-op) was formed. Since then the Co-op has become a British institution and can be found in the majority of towns and cities in the country. Winstanley (1983, p.37) describes the co-operative movement as being rooted in the Owenite Socialism of the 1820s and 1830s and founded on the principles of a voluntary membership, democratic control by and through the trading partners, limited interest on capital, and profit allocated for the development of the co-operative, the common good (the 'Divi' as it was known), or in proportion to the members transactions.

The evolution of the Co-operative movement since 1844 led to geographical groupings (societies) that were independently managed although still affiliated to, and working under, the National Co-operative Movement banner. To the extent that the Co-operative Movement provided improved purchasing power on a geographical basis it has been successful. Unfortunately the lack of an integrated highly professional centralised management structure, uncoordinated marketing and the proliferation of societies and shops, have all led to an increasingly poor competitive market position compared with the multiples (Cox and Brittain, 1991, p.15). Between 1971 and 1991 the co-operative share of the retail market declined from 13.2% to 10.4%, and the number of outlets declined from 7,745 to 2,481. The relative performance of the Independents, Multiples and Co-operatives is illustrated in Table 1.1.

| | No. of outlets 1971 | No. of outlets 1992 | % share of commodity turnover 1971 | % share of commodity turnover 1992 |
|---|---|---|---|---|
| Independents | 86,565 | 32,662 | 42.5 | 11.8 |
| Multiples | 10,937 | 4,577 | 44.3 | 77.8 |
| Co-operatives | 7,745 | 2,481 | 13.2 | 11.8 |
| **Totals** | **105,283** | **39,720** | **100** | **100** |

(Source: Waterson, 1993, p.52)

**Table 1.1 Estimated number of shops and turnover shares by types of retail organisation**

In addition to defining the types of retailer it is also useful to define some of the terms that are widely used to describe the kind of outlets that food multiples trade in. Guy (1994, p.12) suggested a helpful classification which is illustrated in Figure 1.1. There are two basic retail forms - the single building and the group of buildings. Under these two categories it is possible to trace all of the main retail configurations commonly encountered in the UK. Guy suggests that the main food multiples usually operate under the categories of 'Free Standing Store', 'Retail Park' and 'Focused Centre'. Within these categories will be found the *supermarket* with a floor space of less than 25,000 sq. ft.; the *superstore* with a floor space between 25,000 and 50,000 sq. ft.; and the *hypermarket* with a floor space greater than 50,000 sq. ft.. The *warehouse*, which is generally a non-food retail outlet, usually equates in size to either the superstore or hypermarket. The warehouse will not of course be fitted internally to the same standard as the normal food retail outlets. (N.B.. This classification is only valid for the UK.)

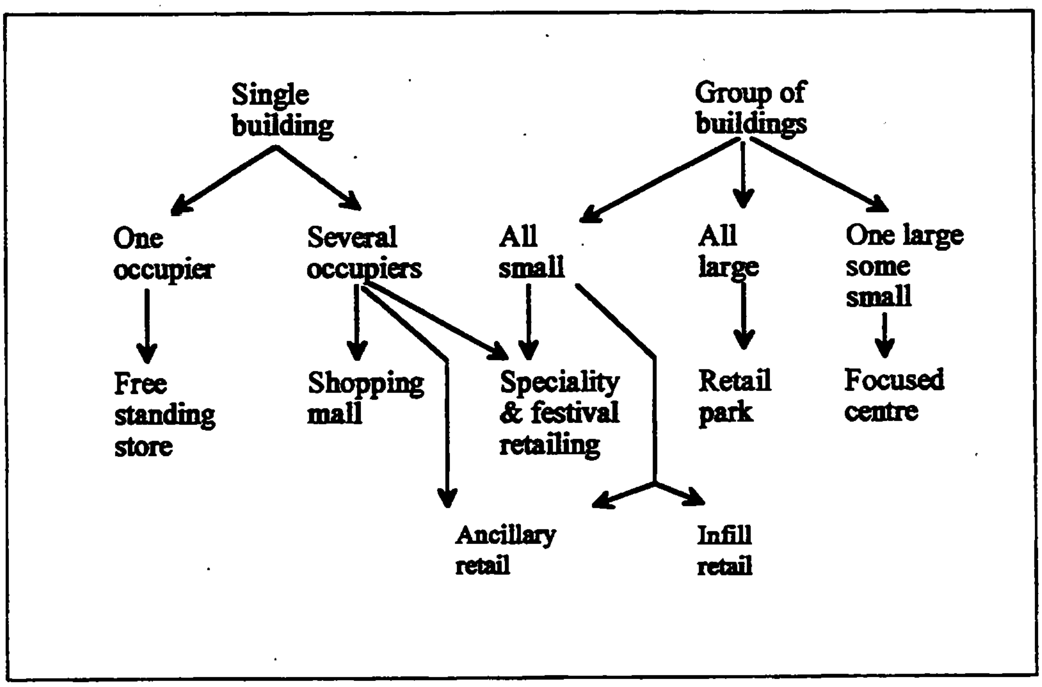



**Fig 1.1 Guy's classification of retail development**

The retail market has many facets that reflect the way in which it has developed. These developments have been driven by the intensely competitive spirit of retailing entrepreneurs and their individual responses to changing customers needs and the economic environment. This point will be examined in greater detail when considering the company histories. The focus for this introduction continues by examining the activities within the retail environment during and around the period 1980 to 1990.

### *1.3 The retail environment 1980 to 1990*

The market environment of the food multiples during this period was dominated by four factors:

a. retail concentration in the UK;

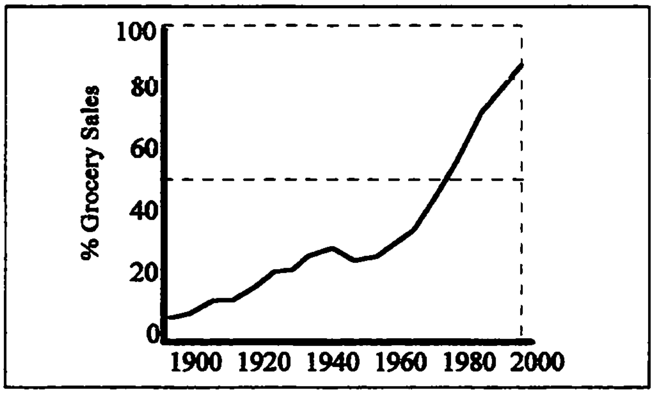
b. demographic and lifestyle changes among consumers;

c. the geographical growth and distribution of large stores in the UK; and,

d. changes in international patterns of retail activity.

### *1.3.1 Retail concentration in the UK*

The general concentration in retailing between 1971 and 1992 from 105,283 outlets to 39,720 outlets (IGD Research Services), has been followed by the grocery sector of the food market. Figure 1.2 illustrates the emerging dominance of the food multiples since the 1960s.




(Sources: Nielsen, 1995, p128; B.O.T., 1995)

**Figure 1.2 Percentage of grocery sales through multiples 1900 - 1992**

The reason for this success is explained by the trading format that the multiples have adopted - larger and more efficient stores, more efficient distribution systems, bulk purchasing and better management control systems. Because of these factors the large food multiples were consistently more profitable than smaller traders throughout the 1980s. Table 1.2 shows that between 1981 and 1990 the large food multiples managed to increase their weekly sales by an average of 6.36%, whereas small food retailers only managed to increase their weekly sales by an average of 1.73%. The Retail Price Index (RPI) figures give an indication of how the overall price of food was changing on a year

| | % change in value of pound by year | % change in RPI (annual averages) | % change in average total retail sales | % change in average weekly sales of small food retailers | % change in average weekly sales of large food retailers |
|---|---|---|---|---|---|
| 1981-1982 | -2 | -4.29 | 4 | 3 | 5 |
| 1982-1983 | -1 | -4.07 | 4.9 | 1 | 5 |
| 1983-1984 | -1 | 0.35 | 4.7 | 2 | 5 |
| 1984-1985 | -2 | 1.05 | 5.7 | 2 | 5 |
| 1985-1986 | 0 | -2.58 | 6 | 2 | 6 |
| 1986-1987 | -1 | 0.71 | 5.8 | 2 | 5 |
| 1987-1988 | -1 | 0.77 | 7.8 | 2 | 6 |
| 1988-1989 | -1 | 2.9 | 5.9 | 5 | 7 |
| 1989-1990 | -2 | 1.65 | 6.5 | 4 | 9 |
| 1990-1991 | -1 | 1.78 | 4.7 | 1 | 9 |
| 1991-1992 | 0 | -2.17 | 3.8 | -3 | 8 |
| Average | -0.73 | -0.35 | 3.8 | 1.73 | 6.36 |

(Sources: Annual Abstract of Statistics, 1994: Tbl. 11.2, Social Trends, 1995: Tbls. 5.27 & 6.13, N.B.. Index 100 set in 1983 )

**Table 1.2 Comparative analysis of percentage changes in value of the pound, RPI and retail performance 1981- 1992**

by year basis. It will be seen that the average price of food was falling throughout this period (-0.35%), but the cost of imports - an indicator of raw material costs (a proportion of which are associated with the food chain) - rose by an average of 4.29% for the same period. The consequence of this increase was to squeeze retail margins and the small retailer, as a price taker, struggled. The large retailers with better bargaining power were able to reduce the impact of price rises on their margins and to improve their overall trading position. These rather harsh trading conditions provided an incentive to improve efficiency throughout the food distribution chain in order to restore margins -

and improving efficiency was a constant strategic theme in the multiples throughout the 1980s. The casualties of these economic forces either left the market or were taken over by the more successful multiples.

*1.3.2 Demographic and lifestyle changes in the UK*

The population of the United Kingdom has grown slowly in recent years. Table 1.3 illustrates the changes that have taken place between 1961 and 1993 (with projections up to 2031). It will be seen that between 1961 and 1993 the overall population only grew by 9.27% (an average of 0.3% per annum), and it was this that effectively set the limit on the growth of the retail market as a whole. If retailers wished to grow within the United Kingdom they could only do so by getting a larger share of an established market place (take-overs), by buying a share of a market place that has some retail synergy with existing operations (horizontal or vertical integration), or by finding a previously unexploited market niche or product range (diversification). The alternative for the large food multiples was to seek growth overseas, and this will be discussed later in this chapter. All of these options offer opportunities for growth on the same cost base.

Two other factors that are of importance to retailers, and which often dictated strategies for geographical expansion within the UK, were population concentration and population migration. In the UK population concentration has traditionally been influenced by the concentration of employers and the availability of employment. Consequently the main clusters of population are to be found in the industrial conurbations centred on London, Greater Manchester, West Midlands, Bristol, Halifax, Glasgow, Tyneside, Nottingham and Liverpool. Since the 1960s a major influence on population redistribution has been

| | 1961 | 1971 | 1981 | 1991 | 1992 | 1993 | 2031 |
|---|---|---|---|---|---|---|---|
| England | 43,561 | 46,412 | 46,821 | 48,208 | 48,378 | 48,533 | 52,435 |
| Wales | 2,635 | 2,740 | 2,813 | 2,891 | 2,899 | 2,906 | 2,977 |
| Scotland | 5,184 | 5,236 | 5,180 | 5,107 | 5,111 | 5,120 | 4,998 |
| Northern Irl. | 1,427 | 1,540 | 1,538 | 1,601 | 1,618 | 1,632 | 1,831 |
| United Kingdom | **52,807** | **55,928** | **56,352** | **57,808** | **58,006** | **58,191** | **62,241** |

(Source: Office of Population Census and Surveys; Government Actuary's Department, General Register Office (Scotland), General Register Office (Northern Ireland))

**Table 1.3 Population of the United Kingdom 1961 - 1993 with projections to 2031**

(Excepting dates, numbers in thousands)

changes in the road and motorway infrastructure. As a result the motorway corridor towns such as Reading, Swindon, Milton Keynes, Northampton, Cambridge and Peterborough have been the focus for business re-location and population concentration (Nielsen, 1995, p16). Table 1.4 illustrates the regional population changes for the period 1981 to 1993.

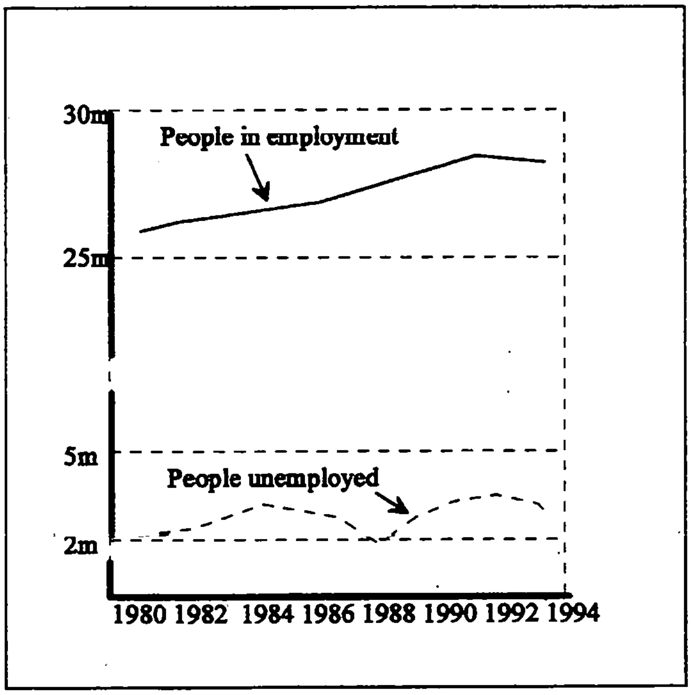
The movement of population from North to South was primarily due to the search for employment as the heavy engineering, shipbuilding and mining industries of the North closed. The depressed economic areas in the North created in the wake of these closures proved to be fertile ground for the low cost retailers. These economic conditions restricted the northern migration of the larger food multiples who positioned themselves at the middle or higher end of the market. This is reflected in the growth patterns of the large food multiples, subsequently discussed in this chapter and in Appendix 1, and the low density of these large middle to high market food multiples above a line drawn between Manchester and York.

| Resident Population | Change in '000s |
|---|---|
| North West | -173.52 |
| North | -76.56 |
| Scotland | -60 |
| Yorks. & Humberside | -37.92 |
| West Midlands | -7.68 |
| East Midlands | 106.08 |
| Wales | 93 |
| Northern Ireland | 94 |
| East Anglia | 168 |
| South West | 286.56 |
| South East | 435.36 |

(Sources: Office of Population Census and Surveys; Government Actuary's Department, General Register Office (Scotland), General Register Office (Northern Ireland))

**Table 1.4 Regional population changes 1981 to 1993**

In addition to the migration of people in search of work there was also a change in the structure of the working population in the UK illustrated in Figure 1.3. While overall unemployment fluctuated between 7 and 11% of the working population between 1980 and 1994 (peaking at 11% in 1986), the total number of people in employment has been fairly steady at approximately 27.5m. Of this relatively stable work force there have been significant shifts in the balance of the work force. Between 1980 and 1994 the full timemale work forced dropped by 10.3% (14.36m to 12.87m) while part time male employment increased by 59.4% (0.40m to 0.99m). In comparison female employment has increased. Full time female employment has risen by 19.4% (5.14m to 6.13m) and part time female employment has risen by 32.5% (3.97m to 5.26m) [Social Trends, 1990, Tbl. 4.4 and 1995, Tbl. 4.4]. Townsend (1986) suggested that the overall increase in part time employment experienced during the early 1980s was probably due to the increase in size of the retail sector. This is difficult to verify as the food multiples quote




(Sources: Social Trends ,1990, Tbls. 4.12 & 4.28; 1995, Tbls. 4.12 & 4.18)

**Figure 1.3 Employment and unemployment in the UK 1980 to 1994**

their employment statistics in terms of Full Time Equivalents (FTE) - however, it does seem likely that they had some influence on these statistics. Those in employment, either full or part time, found that the traditional opening hours of the food multiples were inconvenient and this put pressure on the retailers to increase their opening hours to include evenings. The Sunday Trading Act (1993) made seven day trading a possibility and the majority of the multiples now open seven days a week. It seems probable that this trend to increasing trading hours will continue if UK retail trading patterns follows those of the USA, where 24 hour trading is becoming the norm.

The changes in employment patterns were accompanied by changes in shopping patterns. Table 1.5 clearly indicates that there was a significant move away from the woman as the dominant shopper, to women and men sharing the responsibility for shopping. Again, this had an effect on the food multiples as traditional merchandising strategies tended to be based upon the premise of the woman as the main shopper. As employment patterns changed during the 1980s so did the patterns of disposable income. With an index set at 100 in 1990, real household disposable income has risen 30 points from 70 in 1980 (Social Trends , 1985, Tbl. 5.1, 1990, Tbl. 5.1). In part this is explained by wage settlements being higher than the rate of inflation during this period and in part by the fact that on average there were more wage earners per household as women were

| | Mainly man | Mainly woman | Shared equally |
|---|---|---|---|
| 1983 | 5 | 51 | 44 |
| 1991 | 8 | 45 | 47 |

(Source: Social Trends, 1995: Tbl. 2.7)

**Table 1.5 The percentage of men and women doing household shopping**

undertaking full or part time work. The effect of this increase in disposable income was to increase spending on non essential or luxury items. Car ownership increased between 1980 and 1990 from 60.3% to 67.0% of households. More significant than this is that the households with more than one car rose from 15.2% to 24% (Family Expenditure Surveys, 1990). In many cases the second car owner was the woman of the house. The increased mobility that the second car provided made shopping in a wider geographical area a possibility. The increased affluence also allowed people to buy other luxury items. One of the most significant for the food multiples was ownership of refrigerator - freezers that grew from 36% to 50% of households between 1980 and 1990 (GFK Marketing Services, 1992). So, not only could the shopper get to the new stores that were being built on the edge of towns, but they could also buy in bulk, transport and store the food for longer periods of time. This pattern of shopping was ideal for the superstore format and enabled much of the expansion that took place either in the large edge of town stores or in the shopping centres based near motorways. Two examples of this kind of development are Milton Keynes and Brent Cross.

The age structure of the population changed significantly between 1981 and 1993. The under 16 age group declined from 22.3% to 20.6% of the population; the 16 to 39 age group has remained more or less static at 34.9% of the population; the 40 to 64 age group has increased from 27.8% to 28.8% of the population; the over 65 age group has increased from 14% to 15.8% of the population (Social Trends, 1995: p17). As the population age profile changes the retailers must respond. The abnormal increase in births in the period immediately after World War Two created a large population in the age range 30 to 40 during the 1980s. Astute retailers focused their merchandising strategies on this high spending age group. However, changing age patterns continuously create new challenges for the retailers. During the 1980s an increasing proportion of the population became elderly. This meant that their disposable income and mobility dropped and large edge of town stores did not attract the elderly customers who have to rely on public transport. Some retailers thought that this would not have a large impact upon their trading. However, this age group tend to shop at times when other age groups are working and can help to cover some of the overhead costs during quiet periods. Partly in response to the elderly group of customers; partly to attract the lunch time and 'going home' shopper; and partly because the availability of large edge of town sites was beginning to decline, food retailers reconsidered the inner city sites they previously ignored. Sainsbury are reconfiguring some existing town centre stores to sites was beginning to decline, food retailers reconsidered the inner city sites they previously ignored. Sainsbury are reconfiguring some existing town centre stores to cater for these new shopping patterns and call the new format Sainsbury 'Central'. Tesco have a similar trading format called the 'Metro' store.

*1.3.3 The distribution of stores*

The location and number of stores is driven by the availability of land, infrastructure and a suitable population catchment area. The numeric growth of the larger stores began in the 1970s when Asda, copying the American superstore trading format, began to build larger stores. At the time the UK was suffering from the combined effect of a recession and an oil supply crisis and this caused cost inflation in the retail environment at a time when the retailers were not able to increase prices (if anything the recession put pressure on the retailers to reduce prices). The large store format offered the retailers economies of scale and better in-store efficiency, factors that the food multiples were quick to recognise as they turned to building stores in the new large format. An example of comparative factors related to store size is shown in Table 1.6 which clearly illustrates that the large stores have 33% lower labour costs, 13% higher sales per sq. ft., and 48% higher operating margins pro rata than the smaller shop formats.

During the 1970s the availability of suitable edge of town sites was curtailed by planning legislation and the relatively strong political lobby of in-town traders. However, during the early 1980s the Government relaxed the planning regulations and this enabled a period of retail building. The large edge of town stores (those with a square footage greater than 10,000 sq. ft.) increased from 19% of all stores in 1980 to 78.5% of all stores in 1993 - a growth from 239 to 644 stores ( IGD Research, 1995; Neilsen, 1995, p47). Since 1990 the rate of growth of new large store building has slowed considerably.

| Store size (sq. ft. sales area) | Wage costs | Sales per sq. ft. | Operating margins |
|---|---|---|---|
| less than 15,000 | 124 | 95 | 66 |
| 15,000 - 25,000 | 102 | 95 | 96 |
| more than 25,000 | 91 | 108 | 114 |
| Company average | 100 | 100 | 100 |

(Source: Richards & MacNeary, 1991, Table 2.8 - for J. Sainsbury)

**Table 1.6 Comparative wage costs, sales intensity and operating margins by size of store**

A tightening of planning regulations by the Government, a diminishing number of suitable sites and market saturation in the most populous geographical areas have all been contributory factors. During the 1980s the rate of growth of these large stores has not been uniform across the UK. Table 1.7 shows the regional variation for superstore opening between 1980 and 1990 and also clearly indicates the regional variations and highlights the popularity of the South East (33.6% of all openings) as a location for large stores. This is primarily due to the high population concentration in this area. Conversely, East Anglia, an area with a relatively low population density, had fewest store openings. Although the South East emerged as the area with the largest number of new large stores overall, it is noticeable that the early 1980s were marked by the growth in large store numbers in the North. This is explained by the fact that Asda, the group who were first to exploit the newl large store format, were based in the North. Also, many of the councils in the South East resisted the development of the superstores preferring medium sized super markets (Airey, 1993, p15).

| Year | Scot. | North | Yorks. & Humbs | North West | East Mids. | West Mids. | Wales | East Anglia | South West | South East | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1980 | 4 | 2 | 1 | 2 | 3 | 4 | 3 | - | 3 | 8 | 30 |
| 1981 | 3 | 1 | 4 | 2 | - | 5 | 2 | - | 2 | 9 | 28 |
| 1982 | - | 2 | 2 | 1 | 3 | 1 | 1 | 1 | 8 | 12 | 31 |
| 1983 | 3 | 1 | 4 | 3 | 3 | 3 | 1 | 1 | - | 9 | 28 |
| 1984 | 2 | 1 | 7 | 2 | 3 | 1 | 4 | - | 1 | 5 | 26 |
| 1985 | - | 3 | 3 | 4 | 2 | 2 | 1 | 1 | 3 | 11 | 30 |
| 1986 | 1 | 4 | 2 | 4 | 4 | 4 | 3 | 2 | 3 | 13 | 40 |
| 1987 | 2 | 1 | - | - | 2 | - | - | - | 2 | 5 | 12 |
| 1988 | 1 | 7 | 3 | 8 | 3 | 5 | 2 | 3 | 3 | 11 | 46 |
| 1989 | 2 | 1 | 6 | 4 | 7 | 6 | 1 | 1 | 11 | 35 | 74 |
| 1990 | 3 | 5 | 6 | 9 | 2 | 10 | -1 | 8 | 2 | 19 | 63 |
| Total | 21 | 28 | 38 | 39 | 32 | 41 | 18 | 17 | 38 | 137 | 408 |

(Source: IGD Research Services)

**Table 1.7 Multiple superstores opened between 1980 and 1990 by region**

*1.3.4 International activities and influences*

During the 1980s many of the more successful UK retailers looked abroad for expansion. The UK market provided fewer opportunities for growth through acquisition, and with a more or less static population the overall UK market size was not growing significantly. Most of the retailers sought to apply their formula for success in the UK market to overseas markets - the food multiples were no exception. McGoldrick (1995, p8) identified six 'product' or 'format' led approaches taken by the retailers to the internationalisation process. The first is *licensing* in which the company sells an overseas organisation sole rights to products made by the licenser. This arrangement usually involves the organisations working at arms length with little investment required by either party and no exchange of equity. It is a low risk, low cost strategy for the licenser but has the disadvantage of giving little control in the overseas operation. McGoldrick points out that licensing is relatively unusual among UK retailers.

The second approach is that of *concessions*. In this approach the organisation seeks to transfer an established trading format into an overseas organisation and might, for instance, hire or buy square footage in an established store or chain of stores. The example quoted by McGoldrick is that of Burton (the clothes retailer) and Galeria Preciados in Spain. This is a method of overseas operations favoured by many retailers of luxury products for whom format is an important consideration. Again this is a low risk, low cost strategy for the retailer but it has the advantage of greater control.

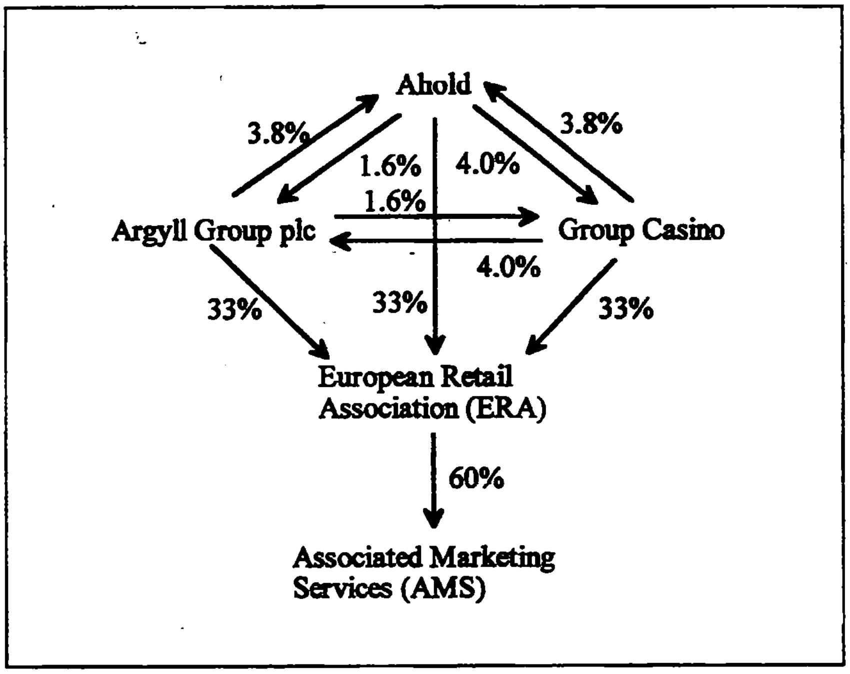
The third category of international operations is *franchising* in which the whole trading format (i.e. store design, equipment, materials and products, livery, etc.) is installed and leased to a foreign organisation or individual. As the lessee usually pays for the franchise, much of the capital risk associated with the venture is removed and profit sharing usually ensures continued income without the associated management costs. The franchise approach has been used extensively in clothes and health care retailing (e.g. Benneton and The Body Shop).

*Joint ventures* is the fourth of McGoldrick's categories. In this approach the organisation seeks a partner familiar with, and operating in, the market in which it wishes to enter. A company is formed in which both partners invest risk capital and jointly own shares. The benefit of this form of arrangement is that market penetration can be quick and less risky because of the overseas partners knowledge of the local markets. The joint ownership of the enterprise increases control but also financial risks. As will be illustrated in a later chapter dealing with the history of J. Sainsbury, many of these partnerships prove difficult to maintain in the long run and are often dissolved, or one partner buys out the other's shares and takes complete control. This is not entirely surprising as most retailers have a strong sense of corporate identity and are often managed by entrepreneurs with a singular view of business and how it should be managed.

The fifth approach to internationalisation is *acquisition*. This approach is often favoured by successful UK retailers who are seeking to establish an overseas presence quickly. The cost and risk associated with this approach are high because the target for the acquisition is often an organisation that is trouble. The risk may also be associated with cultural issues and the acquirer's belief that the formula for success in one country will work in another. A good example of this approach was observed when Marks and Spencer took over Brooks Brothers and Kings Supermarkets in the USA. It was several years before these enterprises made a contribution to Marks and Spencer's profits. Within this strategic approach may be part-acquisition as was the case when Tesco took a significant share of the Global food retail chain in Hungary.

The last of these international entry strategies is that of *self-start entry*. In this approach the organisation starts from scratch and seeks to grow in response to local market demands and opportunities. This is the highest risk option although costs can be limited by restricting the size of the initial venture. Clearly this is not a strategy that would be pursued if an organisation were seeking rapid overseas market penetration. It does however give time to acquire knowledge of the overseas market and develop people to manage the overseas operations. Often quoted examples of this pattern of development are the early activities of Woolworth's in the UK and of Laura Ashley in the USA.

The strategies that McGoldrick outlines are essentially those of movement of either all or part of a trading format into the overseas market. Other approaches to internationalisation involve cross border trading alliances that are formed for other purposes (e.g. continent wide purchasing, logistical optimisation, product development or political lobbying). These alliances have been a feature of the development of the EC. A good example of such an alliance was described by Robinson and Clarke-Hill (1993, 1995) and is shown in Figure 1.4. The main participants in this alliance are the Argyll Group plc (Safeway), Ahold of the Netherlands and Group Casino of France. When the alliance was formed these three organisations exchanged shares (shown in percentages) of more or less equal value. Then together they formed the ERA (European Retail Alliance) with equal ownership, and in turn this took a 60% share in AMS (Associated Marketing Services). Considering the trading turnover of these three organisations, this alliance has very large buying power that is put to its member's advantage. Since its inception AMS has grown considerably and now has eight other organisations affiliated to it (i.e. Allkauf (Germany), Superquinn (Ireland), Rinascente (Italy), Kesco (Finland), Mercadona (Spain), J. M. R. Martins (Ireland), Hagen (Norway) and ICA (Sweden)). Other alliance that involve UK food retailers are BIGS (Spar UK), CEM (Booker), EMD (NISA), NAF (CWS UK) and SEDD (J. Sainsbury) [Source: Nielsen, 1995]. Because of the cross share holding arrangements Robson and Clarke-Hill define these alliances as 'tight' alliances. Other 'looser' alliances are often associated with existing trading relationships or because of the diversification and acquisitions that many of the large food multiples have undertaken. For example Sainsbury has a 'tight' alliance with Esselunga, Delhaize and Docks in SEDD. It also has 'loose' arrangements with the Retail Consortium (UK trading), the IGD (political lobbying) and GB Inno of Belgium (DIY joint venturing within the Homebase format). Full ownership of Shaws and partial




(Source: Robinson & Clarke-Hill 1993)

**Figure 1.4 The European Retail Alliance**

ownership of Giant in the USA gives it access to buying alliances in the USA. Within the Homebase trading organisation there is also another loose co-marketing arrangement with Laura Ashley furnishings. The alliance patterns of J. Sainsbury are not untypical of the complexity of national and international trading that has been and continues to develop in the retailing business.

### *1.4 Summary*

This introductory chapter clearly illustrates the complexity of the environment that influences the activity of the food retailing multiples. Internally the need to preserve margins by focusing on efficiency has been, and continues to be, a constant theme. Improved margins means money for investors and money for development. Even though the traditional trading margin in the food retailer are low, the monies that pass through the multiple food retailing system is huge. In 1994 Sainsbury, Tesco and Safeway had a collective turnover of £24,572,000,000, with gross profit margins of £1,742,000,000 (Source: Company Reports and Accounts, 1994) - and even a small increase in efficiency will save a great deal of money. Investment in system efficiencies has historically given operational efficiency gains and inevitably this has meant an increase in productivity either through increasing trading on the same number of employees and sites, or maintaining the same level of trading with fewer employees. In the case of the food multiples investment in information systems technology has also been the base on which overall growth has been built, maintained and controlled.

From a market point of view the food multiples have been subject to both macro economic, micro economic and demographic effects. It has been shown that changes in population density and location have greatly influenced the geographical development of the food multiples. It has also been shown that the food multiples have substantially changed the nature of many town centres as they have moved to edge of town or out of town locations. By making these changes in trading location the food multiples have created new opportunities to broaden their food product and non food ranges. However, these opportunities have been led by the customer and changes in the customers life style. Clearly an astute marketing strategy is needed to respond to the changes and, as will be demonstrated in subsequent chapters, it is technology that supplies the information to accurately monitor the changes as and when they occur.

By the 1980s the UK food retail market was approaching saturation. The food retailing multiples began to look abroad to achieve substantive growth. The approach to internationalisation has been varied and usually focused on the perceived strengths of the individual multiple. Sainsbury and Tesco have adopted an acquisition approach in the belief that the formula for success in the UK would work on the continent and in the USA. In both cases severe losses were incurred and retail tactics had to be adapted to countries that were geographically larger, had lower gross margins and which had very different cultural traditions. Safeway chose a different route, instead of trying to trade abroad they used purchasing networks in the EC, and in doing so improved their trading margins in the UK. Whatever the mistakes of the past when venturing abroad the continued pressure for growth is likely to make international activities a substantial part of the food retailers strategy.

The public face of the retailers is what we can all see and judge, we know what attracts us to one retailer as opposed to another and we are capable of making subjective judgements, that are, after all, when collectively viewed, what constitutes a market. The private face of the retailers is very different and can be difficult to access. Within this private world competition is fierce with market share and profit performance the subject of intense scrutiny by the financial institutions and other shareholders. Food retailer strategies in particular are closely guarded secrets and these strategies must be designed to respond to the kinds of change and challenge that have been described in the final part of this chapter. These strategies, that allow a food retailer to exploit their market are expressed in several ways: the market sector or segment they choose to trade in; what kind of buildings and locations they use; the product mix they develop; the distribution systems they use; international activities; and of course the information systems they use to control and support their operational strategies and measure their core competences. The correct focus and the combination of these elements within an overall strategy can make a retailer successful nationally, but such success may be fleeting because the real retail battle is increasingly being fought locally as the large food retailers vie for our individual custom. What will be subsequently be demonstrated, is how information technology has allowed general strategy to be deployed effectively while at the same time maintaining the overall system operational efficiency and the advantages of economies of scale.

# *Chapter 2*
## *Literature Review*

### *2.1 Introduction*

This chapter reviews four broad areas of literature that are relevant to this research and to the business and operations of the food retailing multiples. *The objectives of this literature review are to identify the academic context within which this research sits, to provide evidence of the originality of this research, and to provide a conceptual framework for the design of the methodology.*

The review begins by considering strategy as a broad directional concept derived in response to the market place, then strategy is considered in the context of a tool to develop core competences and competitive responses. Finally strategy is examined from an operational point of view within the context of the food retailing environment. This part of the literature review provides a background against which the strategic activities of the food multiples may be evaluated. The second area of literature examined considers the relationship between technology in a general sense and different aspects of organisations. This literature is of value in evaluating the observations about technological developments in the different food retail multiples and together with the literature on strategy it forms the main theoretical underpinning of the research. The third area of literature reviewed is that of performance measurement. This will trace the way in which the philosophy and practice of performance measurement has changed. Given that performance measurement is a reflection of the strategy and objectives of an organisation (Neely, et al, 1996), this aspect of the literature review will act as a useful framework to understand the evolution of operational control systems that are a central to the retailers operational strategies and to this research. The fourth area of literature reviewed is that of the development of distribution systems. These systems are central to the operations of the food retailing multiples, and an examination of the issues that are raised by this literature is an important background to the analysis of the development of the retail control systems. The choice of literature reviewed in each of these areas is driven either by the need to establish a general intellectual framework for this research, or because the literature has a direct bearing on the structure of the research programme itself.

### *2.2 A review of the literature on strategy*

#### *2.2.1 The evolution of strategic concepts.*

Strategy is a word derived from the Greek *stratégia,* meaning generalship. A dictionary definition of strategy is -

> "... the art of war, (the) management of an army or armies in a campaign, art of so moving or disposing troops or ships or aircraft as to impose upon the enemy the place and time and conditions for fighting preferred by oneself."
>
> (Concise Oxford English Dictionary, 1978, p.1138)

The military context of the word strategy has been adapted within the past 30 years to include the activities of organisations in the business environment. In a recent definition of business strategy by Mintzberg and Quinn (1991, p.5) the *enemy* has been replaced by *competitors* in a market place, *troops* etc. have been replaced by *resources*, but the focus of an opponent remains -

> "...A **strategy** is a *pattern* or *plan* that *integrates* an organisation's *major* goals, policies, and action sequences into a cohesive whole. A well formulated strategy helps to *marshall* and *allocate* an organisation's

resources into a *unique and viable posture* based on relative *internal competencies* and *shortcomings*, anticipated *changes in the environment*, and contingent moves by *intelligent opponents*."

Within these definitions there are several in-built assumptions. The first is that there is a cohesive and normative control structure; the second is that the field of operations can be clearly defined; the third is that an organisation can effect outcomes in the environment in which it operates; the fourth is that the environment in which the organisation operates is governed by the rule of logic; and finally that cause and effect within the environment can be measured. The extent to which these assumptions are true has a great impact upon the nature of the strategy that an organisation pursues.

The military context of the definition of strategy invokes the idea of the great fixed piece battles of the past - Agincourt, Waterloo, the Somme - in which generals positioned troops and resources to gain the best attacking position and make best use of their resources. When the battle began the cohesion of the general strategy often deteriorated as hand to hand fighting commenced. What mattered then was the General's tactical ability to read events and respond in an appropriate way (Keegan, 1978, pp.45-54). Are these military patterns of response of relevance to the organisations who operate in competitive market environments?

The answer to this question for the early business strategy theorists seemed to be yes. Chandler (1962), Ansoff (1965), Sloan (1963), and more lately Porter (1980, 1985) are all in the *Classical* tradition of strategic theorists. This has been described by Whittington (1994) as being rooted in the formal tradition of business and being driven by a profit maximisation rationale. Within this perspective the focus for strategy is the internal working of the organisation and a rational planning process that is influenced greatly by an analytical-economic perspective. Chandler and Ansoff, with their intellectual roots in America's Ivy League colleges, and Sloan influenced by his experience in the upper realms of big business, were attracted by the view that strategic planning was to be undertaken away from the workplace, just as the military might plan their campaigns away from the battlefield. Porter is included with the classical strategy theorists because his "value chain analysis" approach to creating competitive advantage relies greatly upon a mechanistic view of internal systems and an underlying assumption of rational-economic behaviour within the system and in the market place. With hindsight the main shortcoming of the classical strategists is the naive and deterministic view they took of the social side of organisations.

By the late 1960s academics were seriously questioning the classical approach to strategy and Ansoff (1967) began to distance himself from some of his early writing. Wider observations of managers, organisations and markets that were centred on research by the American Carnegie School, led to a view that organisations are very complex social entities often defying rational analysis. The Carnegie School of researchers concluded that it is the market environment that determines strategy rather than managers. The classical view of strategy was also challenged by Cyert and March as early as 1963, who, together with Herbert Simon, developed what subsequently became known as the *Processual* approach to strategy. Within this perspective the view of the strategist changed from someone who can analyse and mould the future with certainty to someone who works within the limit of his or her own abilities, accepting reasonable solutions rather than ideal solutions, and being led by their own biases rather than some Olympian ideal. Strategy generated within this perspective becomes a 'micro-political' compromise that satisfices rather than profit maximises and which exists as 'adaptive rationality'. This theme has continued to attract the attention of strategists and the expression 'logical incrementalism' was coined by Quinn (1980) to describe this process of strategic planning. Nelson and Winter (1982) further developed the adaptive rationality theme and suggested that the compromise process, over time, becomes an 'heuristic programme' within the psyche of the management team. This heuristic programme is bounded by an organisations routines and norms eventually leading to the state where it is the programme that dictates strategy rather than individual decisions. Mintzberg (1987) likened this process to that of a craftsman moulding clay to form a vessel. The craftsman moulds the clay using intellect and hands in harmony in a process of constant adaptation. He argued that the world is too full of change and surprises to have a fixed strategy and a long term plan.

Closely allied to the *Processual* approach to strategy is the *Evolutionary* approach that influenced much of the academic thinking in the 1980s. As with the processual theorists the underlying belief in this philosophy is that it is markets not managers who determine strategy. However, the Evolutionists have a more fatalistic view of the market place and insist that in a Darwinian sense only the fittest survive. This philosophy owes much to the economist's view of the market place (Hall & Hitch, 1939, Alchian, 1950, Friedman, 1953, Henderson, 1979) in which survival depends upon the successful exploitation of a market niche rather than a grand strategy. In this perspective the role of the manager becomes that of market interpreter, monitor of internal processes and selector of the 'fittest' (however that is interpreted). Henderson eventually became one of the founders of the influential Boston Consulting Group (BCG), whose matrix relating market share to

| | | Market Share | |
|---|---|---|---|
| | | High | Low |
| Market Growth | High | Stars | Question marks |
| | Low | Cash cows | Dogs |

(Source: Perspectives No. 66, The Product Portfolio,

The Boston Consulting Group, Boston, MA)

**Figure 2.1 The Boston Consulting Group Matrix**

market growth (Fig. 2.1), influenced much strategic thinking in the 1980s. This matrix enabled managers to analyse organisations, recognise their current state of evolution (i.e. Dogs (about to expire), Cash Cows (to be milked), Rising Stars (to be encouraged) and Question Marks (needing direction)), and manage the next transition.

The *Evolutionary* view of strategy is inherently pessimistic and paints a picture of organisations as transient entities that survive and prosper only as long they can exploit a market niche. This view has a resonance with the Boston Matrix philosophy and is described by Whittington (1994, p.20) in the following way:

> "...Evolutionists not only insist that markets are typically too competitive for expensive strategizing and too predictable to outguess. They also hold that markets are too efficient to permit the creation of any sustainable advantage. In a competitive environment, elaborate strategies can only deliver a temporary advantage: competitors will be quick to imitate

and erode early benefits."

This reductionist view inevitably leads to a downgrading of strategy per se and replaces it with a relativistic view of the organisation and the environment. Williamson (1991) epitomised this view when he suggested that economy is the best strategy and that the only real competitive advantage an organisation can have in a given market niche is to be more efficient than its competitors.

A fourth view of strategy that has been influential among the strategists in the 1990s is the *Systemic* approach. Central to this view of strategy is Granovetter (1985), Swedberg et al (1987) and Whittington's (1992) theories that as people work and live in a social web of relationships that not only involve their immediate work and family connections, but also wider relationships involving the state, professional, educational, religious and ethnic connections. The Systemicists argue that the concept of right and wrong behaviour, of appropriateness of goals and of concepts of good and bad strategies can only have any meaning within the overall social framework in which organisations and people operate. This is certainly an interesting view and ample evidence can be found to support their contention. For instance it was noted by Logothesis (1992, pp.20-21) how difficult it has been to transfer some Japanese business methods (e.g. Total Quality Management) to western companies and Pascale (1982) pointed out that the Japanese do not have a phrase for 'corporate strategy' and that as a concept it may only be a phenomenon of western cultures. Boyacigiller and Adler (1991) emphasised this when they suggested that strategy can not have any true meaning in societies such as fundamentalist Muslims who believe that life follows a preordained path set by God, or the Chinese who believe in 'Joss' - a combination of luck and fate. This is not to suggest that all organisations or individuals within any given system will behave in the same way, rather it would suggest that pluralism creates unique opportunities and markets that can be exploited by those with the resources and inclination to do so.

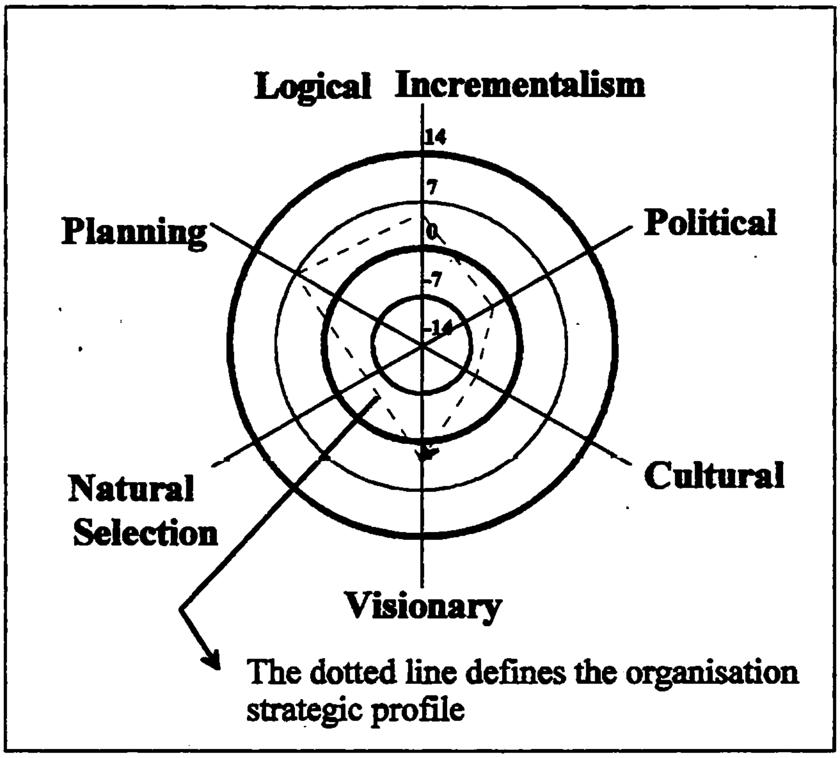
The Classical, Processual, Evolutionary and Systemic approaches to strategy parallel the shift in general management theory from the unitary to pluralistic view of organisational life. However, they are not the only way of analysing strategy. Bailey and Johnson (see Faulkner and Johnson, 1992, p147 et seq.) identified two other approaches - the *Political* and the *Visionary* views. The Political view, that has its roots in the work of Pfeffer and Salancik (1978), Jemison (1981) and Freeman (1984), suggests that in most organisations strategy is influenced by the interplay between the internal and external stake-holders. The extent to which external stake-holders can influence strategy depends upon power relationships that may not simply be economic (e.g. shareholders), they may also be political in the broadest sense (e.g. legislation). The Political view of strategy intellectually sits between the Processual and Systemic views of strategy. Finally comes the Visionary view of strategy that draws on the work of Trice and Beyer (1986), Conger and Canungo (1987) and Bennis and Nanus (1985). The Visionary view postulates that strategies are often the result of an individual view of the future. The 'view' may be derived from entrepreneurialism or from a perspective that challenges accepted norms. However it is generated, it becomes adopted by the management of the organisation, and can beneficially affect that organisation's market performance. As a theory of strategy this is difficult to place accurately although it most logically sits between the Systemic and Evolutionary views.

Taken as a whole it is clear that the view of strategy has changed quite radically from the 1960s. There has been a move away from the comforting view that life can be planned and organised, and will unfold in a predictable way, to a view that organisations respond to the market in unpredictable ways. This latter uncertainty has caused many theorists to question whether there is such a thing a strategy at all. Henry Mintzberg (1994, p.416), concludes:

> "...Through all the false starts and excessive rhetoric, we have certainly learnt what planning is not and what it cannot do. But we also have learned what planning is and can do, and perhaps of greater use, what planners can do beyond planning. We have also learned about our need to solidify our descriptive understanding of complex phenomena - and to face up to our ignorance about them - before we go into prescription."

Bailey and Johnson (see Faulkener and Johnson, 1992) are more positive than Mintzberg and suggest that strategies are rarely rooted in a single strategic philosophy but in fact often encompass elements from several philosophies in different measures. They represent this diagrammatically in Figure 2.2.

In Figure 2.2 the terms 'Political' and 'Visionary' have already been described. Other terms have a direct equivalence to concepts already discussed. For 'Logical incrementalism' read 'Processual', for 'Cultural' read 'Systemic', for 'Natural Selection' read 'Evolutionary' and for 'Planning' read 'Classic'. For a given company, this diagram is constructed following the completion of a management questionnaire. The relative position of the points either side of the 'zero' circle indicates the propensity of the management team to embrace or eschew a particular strategic philosophy. The overall profile (shown as a dotted line) gives an indication of the dominant strategic style of the organisation at a point in time. Clearly this pragmatic view leads to the conclusion that strategy will change as managers change and as organisations evolve through time.




Source : Bailey & Johnson (op cit., p150)

**Figure 2.2. Strategic decision-making profile**

In contrast to many of the strategic theories that have been previously described, and which are predicated on a dominant relationship between the organisation strategy and the market environment, in recent years there has been a resurgence of interest in strategies that are based on internal competencies and resources. This interest has been stimulated by the observations of Prahalad and Hamel (1989) of the success of companies such as Honda, K Mart, Canon and 3M. These companies derived much of their success by developing and exploiting distinctive or core competences and resources that competitors find difficult to emulate. For instance Canon sell their laser engine to many makers of laser printers. Because they can make the laser engine cheaper and more reliable, due to core competences in electronics and laser technology, laser printer manufacturers would find it simply not worth making the investment to develop this technology themselves. Therefore Canon dominate this particular market.

The definition of distinctive or core competence varies greatly. Andrews (in Learned et al, 1969, pp.179-182) defined distinctive competence as:

> "... The 'distinctive competence' competence of an organisation is more than what it can do; it is what it can do particularly well."

Prahalad and Hamel (1996, p.223) defined it as:

> "... a bundle of skills and technologies ... it represents the sum of learning across individual skill sets and individual organisational units"

At a conceptual level these definitions are easy enough to understand although Mintzberg (1994) criticised them as being too vague. He argued that what might constitute a core competence in one set of circumstances may be a weakness in another set of circumstances. Grant (1991, pp.124-127), recognising the same problem proposed that the concept of core competence needs to be refined. He suggested a combination of durability, transferability, transparency and replicability were the keys to competitive advantage:

1. *Durability* - the rate at which an organisations resources and capabilities depreciate or become obsolete.
2. *Transferability* - imitation requires resources and capabilities that can be focused on a market for a competitive challenge. Most resources and capabilities are not freely transferable.
3. *Transparency* - the ability of the firm to maintain competitive advantage depends upon the speed at which opponents can

assess an organisations competitive advantage and how it is being achieved.

4. *Replicability* - an organisation may acquire resources or capabilities through internal investment, but it is harder to acquire capabilities based on highly complex organisational routines.

Coincident with these concepts of core competence is the resource theory of the firm. Originally the resource theory of the firm was based in the thinking of the Austrian school of the 1870s and of Schumpeter (1934). The general argument of the Austrian school was that competitive advantage rose from the market processes and market dynamics. It focused on entrepreneurial discovery, disequilibrium in markets, and time related differences of firm's perceptions of sources of profit - particularly those factors that were specific and unobservable. Penrose (1959, p.137) argued strongly that it was a combination of productive resources and management experience that defines the resource base of an organisation:

> "... In the long run profitability, survival and growth of a firm does not depend so much on efficiency with which it is able to organise the production of even a widely diversified range of products as it does on the ability to establish ... wide and relatively impregnable "bases" from which it can adapt and extend its operations ... to a changing world. It is not the scale of production nor even, within limits, the size of the firm, that are the most important considerations, but rather the basic position it is able to establish for itself."

This theme was echoed by Peteraf who in 1993 suggested that sustainable competitive advantage came through establishing resources and systems that cannot be fully imitated or substituted; ensuring the intrinsic nature of the firms resources are based on tacit knowledge that is not fully mobile; and, where there is limited competition the firm has the luck or foresight in generating the resource. Clearly the concept of the 'resource' was becoming better understood in two senses. The first was the strategic importance of the 'unique resource' as an exploitable feature of the organisation in giving competitive advantage, and the second was a better understanding of what 'uniqueness' actually was. These ideas are refined by the work of Teece et al (1992) in what they called the dynamic capabilities approach. The dynamic capabilities approach clarifies the relationships between the various internally focused strategic elements, and identifies the importance of developing resources and competences to maintain or improve a market position. The definitions that Teece et al proposed are summarised in Table 2.1.

| | |
|---|---|
| Factors of production | These are process inputs that are available in a disaggregated form in factor markets with non-specific use, e.g. land, unskilled labour, money. |
| Resources | Resources are 'near unique' organisation specific assets that are not easily transferred because of cost or tacit knowledge, e.g. patents, trademarks, experienced engineers, specialised production or service facilities. |
| Competences | When organisation specific assets are integrated to perform distinctive activities, then these activities are organisational competences, e.g. special quality capability, miniaturisation, systems integration. |
| Core competences | Core competences are those associated with the survival of the organisation. They tend to define , and be defined by the market in which the organisation operate. |
| Dynamic capabilities | The ability of the organisation to renew, augment or adopt it's core competences over time. |
| Products (or services) | These are the outputs of the organisation that are based on utilising the competences it has. Competitive position will depend upon how well the competences are used in comparison to competitors who source in the same markets. |

(Adapted from Teece et al, 1992)

**Table 2.1. Competence and related definitions**

Mills (1996, p.10) observed that one of the values of Teece et al's approach is that the definition of the product (or service) is useful in defining what resources, competences and capabilities are not.

When considering the strategy creation concepts and processes two underlying themes are evident. The first is that strategy is not an abstract construct, it exists because a group of people or an organisation wish to change, to grow, or to survive in a market. The strategy is a rough, long term plan that tries to make the best use of internal resources (e.g. people, technology, systems), and competences (core or otherwise) to exploit market opportunities that are coincident with their objectives. Because the strategy is by nature a long term phenomenon, and because resources and competences change with time, it is vital for management to constantly appraise and update internal and external changes with long term corporate objectives in mind.

The second theme that emerges is that whatever the philosophical belief that is used in the process of constructing a strategy it cannot be divorced from the core capabilities of the organisation. Meyer and Utterbeck (1993) defined these as:

1. Product (or service) technology capability.
2. Customer needs understanding capability.
3. Distribution channel capability.
4. Manufacturing (or service delivery) capability.

Strong capabilities lead to strong products and services, weak capabilities lead to weak products and services. The implication of this that organisational capabilities and competences will shape strategy *and* enable strategy. This is one of the central concepts at the heart of this research.

*2.2.2 The background to retailing strategies.*

Although the concept of trading is based in antiquity, the concept of the modern retailer selling from a shop rather than a market stall began in the early Middle Ages (circa 1000 AD.) in the UK. Urbanisation created towns and cities and an emergent merchant class who bought, transported and sold commodities. Prior to this period the primary means of exchanging goods was the weekly market or annual fairs at which bartering or exchange took place. Once established, the merchants traded in a wide range of commodities. As sources of supply became more reliable, specialist shops began to emerge and even to cluster geographically in large conurbations. Davis (1966) pointed out that it was not unusual to find ten or twenty shops selling one product or service in a street - a pattern still found today in some cities such as London (e.g. the tailors of Saville Row, shirt makers of Jermyn Street and doctors in Harley Street). There are still roads named after the specialists who plied their trade in the middle ages. In London there is Butchers Row, Poultry Lane and Bread Street; in Northampton, Gold Street; and in Chester, Weavers Street. Similar examples can be found in medieval towns throughout the UK. This pattern of specialisation has survived to the present day the only difference being that modern specialists are often national rather than local enterprises.

From these early beginnings through to the late Victorian times, the concept of a retail strategy would have been considered bizarre by the majority of retailers. Strategies were essentially military phenomena and strategic wisdom confined to the deployment of armies and conquering or defending countries. Ownership of shops often remained in the hands of one family for generations and early retail development usually took place around the traditional market place with shop owners often having stalls on the market

(Wild and Shaw, 1979, pp.35-44; Phillips, 1992). Occasionally in a large city one person may have owned two or three shops. Sometimes people owned shops in adjacent cities and towns. But these were the exception rather than the rule. For the most part shops remained a small unit in a retail cluster or on a thoroughfare, with the owner living above the shop. Because of this parochial view (and limited opposition), retailers rarely required more than a tactical appreciation of what distant opponents were doing.

The core of retailing never changes - buying cheap and selling dear - but the mechanisms of retailing do and the first changes to herald the modern retailing were threefold. Carter and Lewis (1990, p54 et seq.) defined these as the emergence of the lock-up shop that was not the residence of the owner; the department store; and, the multiple retailer. Jeffreys (1954, p.15) found that by 1911, continuing a trends that had been ongoing for at least half a century, 28 percent of retail premises were lock-up shops that could be freely traded as going concerns or as premises for speculation. This condition permitted the breakdown of traditional owner-occupier trading patterns allowing growth through amalgamation and acquisition. Around the end of the 1800s, at the same time as the owner-occupier pattern was breaking down, new retail formats were being tried. One of the most interesting was that of the department store. Shaw (1992) identified two basic configurations. The first was of a collection of independent retailers trading under one roof. The second was a single owner operating different retail aspects in different part of a building. Some of these department stores grew very large indeed and the 'shopping under one roof' formula proved to be enduring. Most major cities still have department stores that can trace their origins back to this period in retail history, for example Owen-Owen, Harrods, Fenwicks, Dickens & Jones, Marshall & Snellgrove and the John Lewis Partnership. Multiple retailers (multiples) emerged around the mid 1800s usually as the result of retail families setting up shops in close geographical proximity. This pattern of shop ownership was in evidence during the early stages of Sainsbury's development (Appendix 1). By and large these early multiples were general grocery stores (e.g. Liptons and Home & Colonial), but the patterns of specialisation emerged and by the end of the 19th century there were well established multiples operating in as diverse field as footwear - Freeman, Hardy & Willis, and proprietary medicines - Jesse Boot the Chemist. As a retail format multiples have undoubtedly been the most successful and enduring.

Of these three retail formats it is probably the growth of multiples, particularly in the post World War 2 periods, that has stimulated the need for retail strategies. The reason for this lies in the presence of large and well organised opposition, particularly in the food retail sector. With such opposition it was no longer possible to rely on tactics for survival.

*2.2.3 Emerging food multiple retail strategies*

Powell (1991, p.155-157) argued that there could only be three retailing strategies. Expansion in one market sector, diversification between market sectors, or a combination of both. In making this assertion Powell was echoing the early work of Ansoff (1965), and, it could be argued, oversimplifying the nature of retail strategies. In truth, Powell's assertion has some validity when considered in the light of the early development of multiple food retailing. Indeed a comparison of the development of Tesco and J. Sainsbury up to 1950 (Appendix 1) would tend to confirm this view. Knee and Walters (1985, pp.1-9), in exploring the work of Yavitz and Newman (1982), Shirley et al (1981) and Hofer and Schendel (1978), suggest that a more acceptable (and subtle) definition of retail strategy is a combination of:

a. a predetermined direction by which short term fluctuations might be avoided,

b. a qualitative statement concerning the 'quality and texture' of the business,

c. a longer term plan that sets the direction and tone of shorter range plans,

d. a means of integrating functional activities, setting priorities and weighing risks,

e. a statement which must communicate and motivate as well as integrate functional activities.

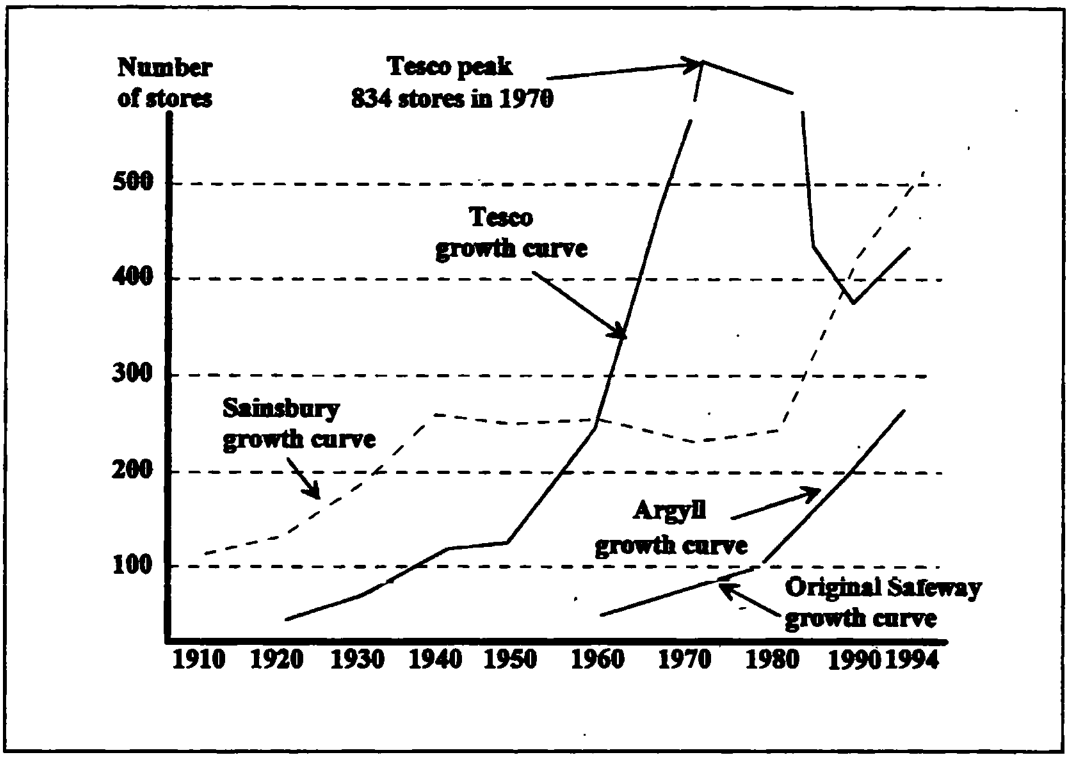
In short, they argue, strategies must define an organisation's relationship with it's environment in terms of customer mix, product mix, the geographical limits of operation, the organisation's competitive emphasis, and finally the performance criteria by which it is to be judged. Contextually the shift in emphasis between Powell and Knee and Walters is that between the Classical and Processual approaches to strategy.

An additional issue that Knee and Walters raise in the retailing context is the need to differentiate between strategy and policy in retailing. They suggest that there is a great deal of confusion between these two concepts in the retail environment. Conventional wisdom, perceives policy as "the nature of a firm's involvement with its environment". Policy would normally address issues such as market positioning, operational control, geographical coverage, outlet size and location, financing, growth, merchandising, pricing, advertising and promotion. Clearly all of these policies cannot have the same weighting and it may be necessary to subdivide these policies into corporate policies that dictate an organisation's position in a market, and functional policies that create a framework in which operating decisions can be evaluated. In general, corporate policies will dictate overall direction for an organisation, whereas functional policies will dictate the approach to some of the tactical issues such as merchandising and advertising. In a nutshell then, strategy is related to targets, and policy is how you achieve them. The outcome of strategy is success in your chosen market, the outcome of policy is the harmonious and efficient use of resources to realise the strategy.

The great problem in ascribing strategies to the large food retailers is that they are very reluctant to discuss (except at a very general level) what their precise strategies are at any given time. Fortunately Tesco, J. Sainsbury and the Argyll Group are all large corporations and from direct and indirect sources it is possible to deduce in fairly broad terms what their strategies probably are. Also, because they are such important organisations, their activities and market place attracts the attention of many informed researchers, observers and analysts. These people and organisations (e.g. the IGD) publish literature and market analyses that enables realistic estimates about retailer strategies to be made. Historically this has not always been the case and the strategies that were pursed by the retailers in question (assuming they actually had a strategy) can only be realistically deduced through a study of their history.

### *2.2.4 Searching for retail strategies*

The histories of J. Sainsbury, Tesco and the Argyll Group are very different, although they have all ended competing in the same market segment and all have a substantial share of this market. An examination of the growth patterns (Figure 2.3) of the three companies reveals some of the strategic problems the companies have been facing as they have developed. Up to 1940 Sainsbury had been growing quite steadily but this growth was disrupted by the war. Austerity after the war held back further growth and then the need to modernise in the 1950s and 1960s took most of the company's development capital. In this period Sainsbury must have been well aware of Tesco's meteoric growth (in the number of shops but not in turnover terms). The gravest danger this represented to Sainsbury's was that Tesco, in acquiring a large number of stores, was in effect sitting on a vast capital reserve that was rapidly increasing in value. Clearly when this capital was released Tesco would be able to fund expansion without significant borrowing. This would certainly wrong-foot Sainsbury strategically at a time when the cost of each new store was increasing rapidly and there was an urgent need to obtain capital for growth.




(Source: Company Reports and Accounts)

**Fig. 2.3 Growth patterns of Sainsbury, Tesco and Argyll**

Substantial borrowing would have eroded the profit margin of the company and failure to invest would have opened the market door to Tesco and the emerging Safeway. It is probably significant that in the early 1970s many of the old directors of Sainsbury retired paving the way for the sale of 10m Sainsbury plc shares that raised £450m in growth capital. This money was used to fund the growth and diversification. In particular the company wished to begin an internationalisation programme through the acquisition of Shaw's in the USA.

Tesco early growth followed a similar pattern to that of Sainsbury from 1920 to 1940. However, the War that severely affected Sainsbury did not have such a pronounced effect on Tesco as they had fewer stores. In 1950 Tesco began aggressively acquiring other multiple retailers. Most of the acquisitions were achieved through share issues. Although these had the effect of diluting the ownership of Tesco, Cohen (the Managing Director and founder of Tesco) nearly always made sure that the majority shareholders became executives in the Tesco empire. This had two effects. The first was the removal of the threat of a group of experienced people setting up in opposition to Tesco. The second effect was to import entrepreneurial and administrative skills in to the company. By 1970 Tesco owned over 834 stores. Unfortunately many of these stores were not suitable for the modern supermarket format of trading, but their disposal provided capital for subsequent store and infrastructure renovation during the 1970s. Sales of older stores and the building of new stores continued into the 1980s and 1990s and by 1996 Tesco had overtaken Sainsbury to become market sector leader.

Although Safeway/Argyll only began trading in the 1960s, they achieved a significant market position in a remarkably short time. The origins of the Argyll Group are complicated and begin in the early 1970s when Oriel Foods Ltd. - food manufacturer was formed. Through a series of sales and acquisitions (described in detail in Chapter 4) Safeway plc emerged. Considering the supermarket base from which they started (8 stores in 1971 that traded under the Safeway name), Argyll have managed to expand the Safeway format stores remarkably quickly. The cash base for these activities seems to have been derived from general share issues and this is reflected in the make up of the shareholders (see Table 2.2). It would seem that the banks have been instrumental in the growth of the Argyll Group and this ought not to be too surprising when one considers the amount of money the retailers in general handle each year.

| Shareholder category | Sainsbury % | Tesco % | Argyll % |
|---|---|---|---|
| Banks | 33.31 | 5.5* | 68.1 |
| Insurance Companies | 5.69 | 10* | 10.2 |
| Investment Companies | 0.06 | 60* | 0.2 |
| Other Companies | 5.76 | 8* | 8.5 |
| Pension Funds | 4.54 | 4* | 4.3 |
| Universities etc. | | | 3.4 |
| Individuals | 50.64 | 12.5 | 5.3 |

(Source: Company Reports and Accounts)

* Estimated on the basis of previous annual reports and the 'Size of Share holding' analysis

**Table 2.2 Share holding analysis 1994**

The patterns of development of the three companies reflect the broad changes that were taking place in the food retailing market place and the ever increasing variety of produce sold. The vagaries of growth are more attributable to the managers of the companies than any other single factor. In strategic terms it appears that Sainsbury's strategies were initially of the Visionary type and subsequently became Processual when John Sainsbury relinquished control to his family as the company and market matured. A similar pattern of strategy development can be observed with Tesco except that Jack Cohen did not leave his empire to a dynasty. However, the directors who took over in Cohen's wake behaved in a similar way to Sainsbury by instituting a broad based Board to guide the company into the future. The strategy of Argyll is more puzzling. It was not dominated by one person but was driven by a team of people with a strong formula for success. In many respects the early pattern of development is reminiscent of the Classical strategists. In later times the strategy has become more Processual as the company's activities have become more dominated by the activities of the Safeway stores. From time to time it has seemed that other generic strategies have been in evidence but more often than not this has been a reflection of the operational strategies that the companies have been pursuing.

### *2.2.5 Retailing operational strategies*

Assuming that growth is the generic strategy that paints broad brush strokes on the canvass of multiple retailing, the operational strategies fill in the detail to complete the picture. Operational strategies are required to establish a functional framework for these very large organisations and to guide medium to short term responses to market changes. Walters (1988, p.112) suggested that competitive advantage in retailing relies to a greater extent upon relative differentiation in two broad areas - productivity and marketing. He argues that most retailers will align their medium and short term strategies within these two broad parameters according to the degree of risk they consider to be acceptable. Productivity differentiation strategies he identifies as low risk because they address internal issues that are broadly within managerial control. Marketing differentiation strategies he considers to be higher risk as the elements in the trading environment they address are inherently unpredictable. Productivity differentiation can include:

a. cost management and tightly controlled budgets,

b. efficient distribution systems,

c. effective supply chain management,

d. optimal store design,

e. use of economies of scale.

Marketing differentiation can include -

i. using customer information to refine market approach,

ii. matching product profiles to customer requirements,

iii. pricing policy,

iv. value adding customer services,

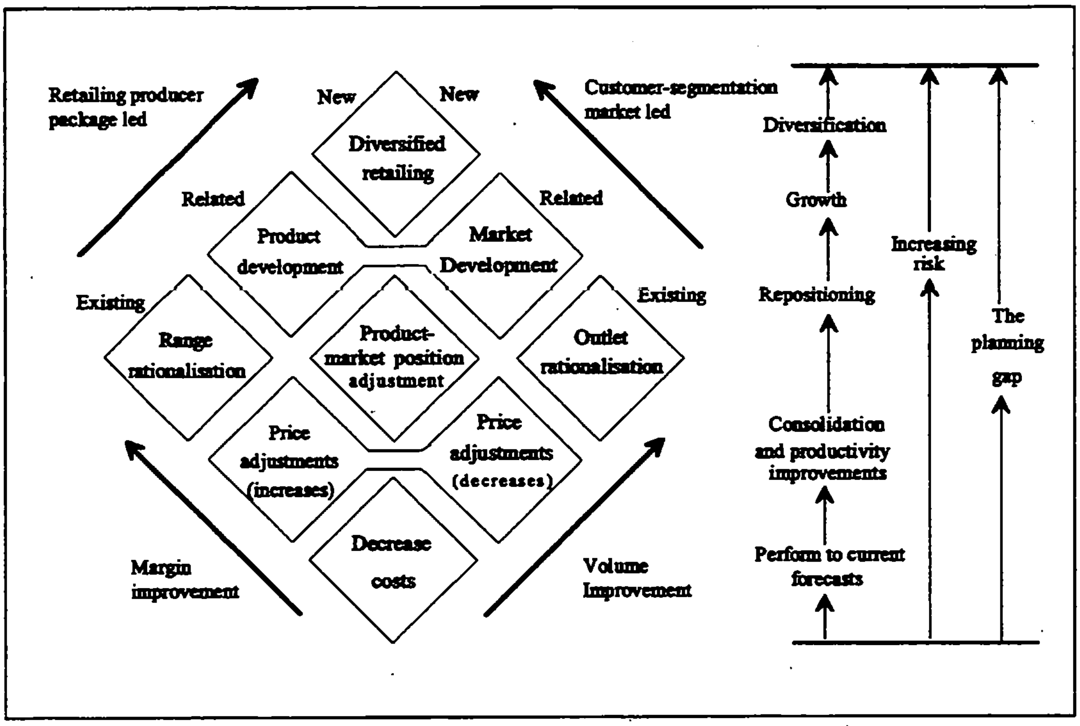
v. niche market location,

vi. strong customer franchise,

vii. location advantage,

viii. market share volume that discourages competitive challenges.

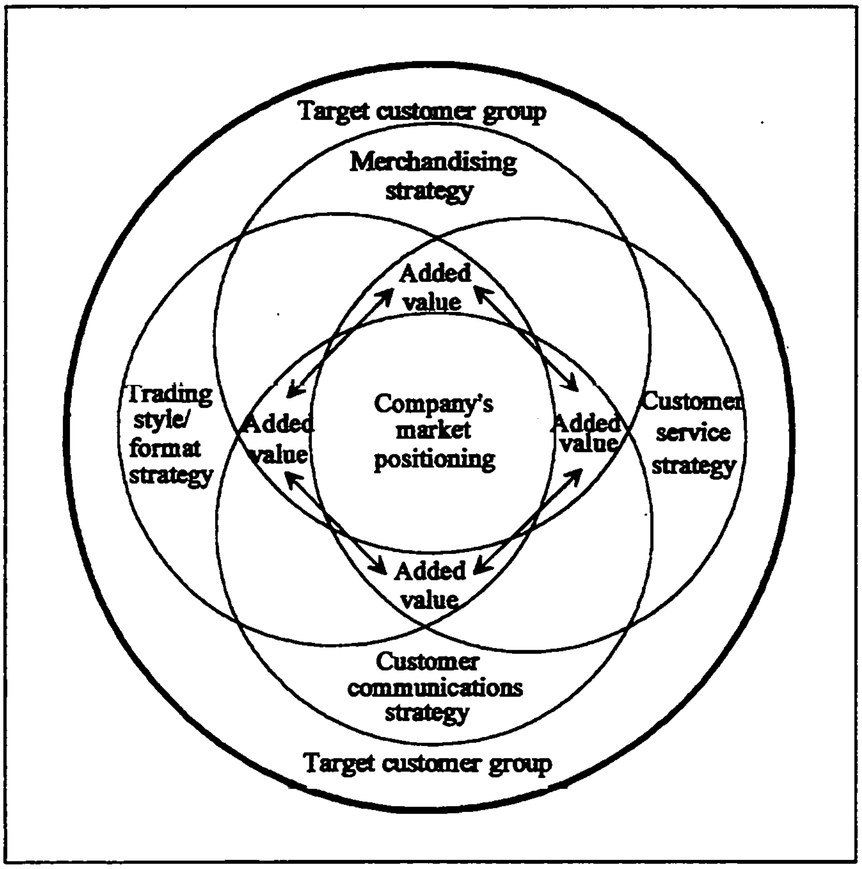
In making these assertions Walters is following in the tradition of Davidson and Doody (1966) and Ansoff (1965) who linked risk with differentiation in the market place. The difference between Walters and Ansoff revolves around their interpretation of the management of risk. Ansoff, in the Classical strategic tradition believed that risk could be contained by managing the internal organisation processes, whereas Walters was clearly havering between the Processualists and the Evolutionists in believing that risk can be managed by identifying and defending a market niche. The problem to be resolved in practical terms is how much risk can be tolerated by the retailer and what the risk-payoff matrix looks like in the real world. Knee and Walters (1985) suggested that risk increases in predictable ways depending upon the size of the planning gap (strategy shift) that was being contemplated. Their ideas are illustrated in Figure 2.4.




(Source: Knee & Walters (1985, p50))

**Figure 2.4. Alternative methods of filling the planning gap**

The matrix on the left hand size of Figure 2.4 identifies the main options that retailers have in the short and medium term. Tactics associated with increasing volume are decreasing costs, decreasing prices, or, outlet rationalisation. Tactics to achieve margin improvements are decreasing costs, increasing prices and rationalising product ranges. These are low to medium risk strategies and tactics that will only partially close the planning gap by meeting current planning requirements, consolidating market position and improving productivity. If these tactics and strategies will not close the planning gap, then more extreme measures will be needed - and of course higher risks will have to taken. On one hand they suggest that change can be driven by product producers, and on the other driven by market segmentation. The outcome of either of these will result initially in market repositioning, and if carried to the logical conclusion, in diversification. Diversification may require a completely new organisation and outlet network, or extensive redefinition of current operations. These are high risk options. A neutral and medium risk option that is often used by retailers is to partially adjust their product and market position more or less continuously maintaining a satisficing profile.




(Source: Walters 1988, p.119)

**Figure 2.5 Relationship between market positioning, added value and (sub) strategic decision areas**

The structure of the sub-strategies is of critical importance in addressing the scope and range of change. The precise mix of sub-strategies an organisation chooses is determined by the market niche the retailer is addressing. By optimising the sub-strategies on a target customer group a retailer is optimising value added for retailer and customer, and at the same time effectively precluding a competitor from entering the market niche. Waters proposes a model based on four sub-strategies and this is illustrated in Figure 2.5. The four sub-strategies are customer communications, customer service, trading style and merchandising. Customer communications deal with the ways in which the organisation informs the customer about the availability of products and services (advertising, promotions, and media management). Trading style deals with the physical image of the company (house livery, store layout and store locations). Customer service deals with additional services that can be offered within the same retailing format (pharmacy, dry cleaning, post offices, bakery, delicatessen, petrol station and coffee shop). Merchandising deals with the range and presentation of the products offered to the customer. The better these factors are co-ordinated, the stronger the company's market position and the better the value added profile becomes.

### *2.2.6 Summary*

One remarkable aspect of the general literature on strategy is how little debate has centred on the impact of technology on strategy. In the military context the technology of war has changed strategy consistently. The long bow gave the English army a significant advantage at the Battle of Agincourt; the flintlock gave Cromwell a significant advantage over the slow fuse muskets of the Royalists; history is littered with similar examples. Each of these technological developments changed the ways battles were structured and fought by giving one side a marginal advantage that could be successfully exploited by an astute general. Even though parallel examples exist in the commercial milieu - the evolution of the production line; the invention of plastics; the transistor; the integrated circuit - the strategic theorists until recently have chosen to interpret these innovations as being enabling rather than driving strategy. Reality is somewhat different and it can be demonstrated that many of these innovations either created new markets or stimulated the evolution of older markets, and as such promoted new strategies rather than enabled old strategies.

Another explanation of the apparent disinterest of researchers on the technology - strategy relationship may be that much of the strategic theory is about the *process* of making strategy rather than *strategic outcomes*. From this perspective prevailing attitudes are more understandable as technology is likely to be viewed as a tool rather than a shaper of strategy. While this attitude is understandable in the historic context when technology was unsophisticated, it is less understandable today when technology is used to create and manage the multi-million dollar businesses, and new concepts of business based not on a real world but on a virtual world of the Internet. These innovations are challenging the very concept of strategy that is predicated on the traditional ideas of an organisation.

The second aspect of the literature review examined the way in which retailers have translated strategic thought into generic strategies and eventually operational strategies. Observations based on the history of Sainsbury, Tesco and the Argyll Group indicate the importance of the ability (or luck) of management and of vision. Vision seems to play a large role in whether or not a retailer succeeds or fails, but this vision needs to be tempered by a detailed understanding of the market place and of the customer's needs. It seems clear that good management by itself is not sufficient. The web of inter-linked operational strategies needs to be closely controlled and tuned if it is to succeed. Whatever the faults of John Sainsbury or Jack Cohen, they had this vision, which coupled with hard work and tenacity built up large food retailing empires. Argyll's place in the triumvirate of large food retailers is very much the result of a more modern management style. Their moves have been at times been carefully plotted and at other times opportunistic. The unseen players Argyll's success are the banking shareholders who allowed them to issue shares (and dilute ownership) to fund expansion deals.

In the formative years of all three companies the underpinning strategy of the organisations was growth in the UK. In more recent years the emphasis has been upon growth in international markets as the home market became saturated. While Sainsbury have looked to the USA., Tesco and the Argyll Group have concentrated upon the EC. At the time of writing these initiatives have met with mixed success. It is probably still too early to be sure about next growth moves although they are most likely to be international.

Since 1990 the UK multiple food retailers have seen significant changes to the operational information systems and technology available. Considering the esteem in which Walters is held in the retailing sector, it is interesting to note how little emphasis he placed upon the impact of technology on the retailers. He must have been aware of the changes that EPoS was making on the fabric of the retailers but chose not to explore it in any detail. This review will not omit this consideration and the next part of this chapter considers the relationship between technology any organisations.

## *2.3 Food retailing technology and information systems*

### *2.3.1 Technological issues*

Technology may be defined as any artefact (or group of artefacts) that does not occur naturally in the environment, that is fabricated by man, and that is used by man as a part of a process. Technology by itself and in isolation is neutral - it has no meaning or value except in use; it has no autonomous existence. However, once someone, a group of people, or a corporate body, makes use of the technology it ceases to be neutral, and the issues that surround the use and ownership of technology can be complex. Use of, ownership or access to technology may confer a financial, social, power or knowledge advantages to a person or group of people. Conversely non ownership, or a lack of access to technology, may place a person or group at a disadvantage. The use and ownership issues are graphically illustrated in the economic differences that exist between high technology societies (the first world) and low technology societies (the third world). Of course it would be naive to suggest that technology is the only reason that economic differences exist between the first and third worlds. Other factors also play a part, for example availability of natural resources, climate, geographical location and political stability. However, Pearce and Stewart (1992, p.239 et seq) in their study of British economic history between 1867 and 1995 point out that it has been the ownership and use of technology that has been an important differentiator between social groups, and also suggest that technology has also acted as a catalyst for economic and social change.

While technology may in itself be neutral, it is difficult for people to be neutral about technology because it affects us as individuals and it can highlight our relationships with our surrounding society. Evidence for this was offered by Pelto (1973) in his study of Skolt Laplanders. He observed that when the snowmobile was adopted by the Skolt it brought many advantages to their society in terms of access to a wide range of goods and services previously unavailable. However, the snowmobiles were difficult to handle and it was only the younger men who could cope with them. Because the younger men effectively controlled access to the new goods and services, their status in the Skolt society became enhanced. The influence of the tribal elders, whose status was based on the traditional ways of life rooted in the utilisation of their reindeer, declined. These changes had two effects. The first was a rapid decline in the birth-rate of the tribe's reindeer herds because the snowmobile's noise caused the female reindeer to abort. The second was an increase in dependency on externally provided goods and services. Neither of these effects could have been expected from seemingly neutral technology.

Similar changes in social structure have been noted by Clegg (1972) and Mathias (1969) when describing the effects of the industrial revolution in the United Kingdom between the mid eighteenth and mid nineteenth centuries. In this period the social structure of the United Kingdom was radically changed from being agriculturally oriented to being technologically oriented. The technology was not in common ownership and those few who controlled it became rich and powerful. Meanwhile, as de Tocqueville (1835) observed, the majority of the industrial working population lived in relative squalor and poverty. These inequalities and deprivations brought about social conflict, for example the Luddite movement of 1812, agrarian violence in 1816 and 1830, Peterloo in 1819, the Rebecca Riots of 1839-9 and Chartism; and the creation of new social power structures, the trade unions for example, that were an attempt to redress the balance of power. de Tocqueville (see Martin and Scharfe, 1970) writing some time after the period of unrest in 1853, considered what the events of the previous forty years as a normal, if somewhat regrettable, state of affairs, and regarded those who exploited productive resources as following natural economic growth opportunities. Marx (1887) on the other hand saw the ownership of productive resources in a wider political context. He argued that the worker, disenfranchised of the means to create wealth (in part because of technology); lacking control over the means to dispose of his efforts; and finding no meaning in his work, would experience alienation. (Marx called this Entfremdung - estrangement.) This alienation created a class division based on the inequitable ownership of productive resources, in the same way that previous class divisions had existed through the inequitable ownership of land. This argument eventually led Marx to conclude that those alienated would (and should) combine to create a more equitable society based on communal ownership of economic resources, and through the process of revolution a communist state. While Marx never specifically mentioned technology in his debate about class (other than by implication), his intellectual successors such as Braverman (1974) and Hyman (1975) developed Marx's social themes to suggest that it was the control of increasingly sophisticated technology, owned by capitalists, that took power away from workers by de-skilling work.

The technology / power debate has threaded its way through industrial relations research for many years with opinions varying considerably about the true impact and importance of technology in power relationships. Braverman and Hyman of the Marxist school clearly consider technology (directly or indirectly) to be a major factor, other researchers such as Brown et al (1978) argue that technology, while influential, was not as important as the size of an organisation in determining the nature of industrial relations. Yet others, such as Barrat Brown (1968), hardly give technology a mention when considering industrial power relationships, preferring to concentrate upon the issues of ownership of the means of production rather than political motivation. The truth about the relationship between technology and power may never be fully defined or understood because the issues are constantly changing as society and technology evolves.

During the industrial revolution the entrepreneurs who founded organisations were usually in close contact with the people they employed and the technology they used. It was relatively easy for Marx to identify the differences between the owners of enterprises and workers. In the ensuing 150 years the ownership of most substantial organisations has become diffuse. Today the large pension funds are often the substantive owners of many enterprises and the board of directors of most organisations are largely made up of managers of the various functions within the organisation. More often than not ordinary managers are employees rather than owners and most work people in the first world no longer have to suffer grinding poverty as a result of exploitation. The differentials between work people and the ordinary managers are certainly not as great as in the past, but the increasing isolation of the owners of organisations often means that in contrast to the owners of enterprises during the industrial evolution they have little appreciation of the social issues that the increasing use of technology raise.

### *2.3.2 Technology and organisations*

Within organisations the relationships between workers, managers, work and technology have been a subject of interest for many years. Adam Smith (1776) was one of the first to analyse the labour processes. His suggestion of breaking down complex processes into their constituent parts as a way of improving performance has been adapted and applied in many organisations. Smith said that the division of labour in processes gave three advantages:

a. through specialisation individuals increased their dexterity,

b. through careful work design time that is wasted because of needless passing of work from one work position to another can be avoided,

c. new machinery could be designed to improve individual productivity and enable one man to do the work of many.

In his famous discussion in the first chapter of Inquiry into the Nature and Causes of the Wealth of Nations (pp.4-5) he uses the example of pin making to illustrate his point -

> "...One man draws out the wire, another straightens it, a third cut it, a fourth points it, a fifth grinds it at the top for receiving the head; to make the head requires two or three distinct operations; to put it on is a peculiar business, to whiten the pins is another; it is even a trade by itself to put them into the paper; and the important business of making pins is, in this manner divided into about eighteen distinct operations, which in some manufactories, are all performed by distinct hands, though in others the same man will perform two or three of them."

Clearly Smith did not equate process division with de-skilling but with productivity; however, Babbage (1832) points out that the corollary of Smith's subdivision of process was a saving in cost through only having to employ people with limited skill (and at lower wage) to do some of the trivial jobs in the process. These early ideas were not wasted on later analysers of work and builders of industry who found that skilled work could often be analysed and reduced to simple elements and as a consequence wages were reduced while productivity was maintained or improved.

The start of process reductionism (in conceptual rather than in practical terms) began with Taylor (1947) who started a movement known as 'Scientific Management' (or Taylorism) [n.b. The book *Scientific Management* comprises Taylor's 3 other books - *Shop Management* (1903), *Principles of Scientific Management* (1911) and *Hearings Before Special Committee of the House of Representatives to Investigate the Taylor and Other Systems of Shop Management* (1912)]. Strictly speaking Taylorism is associated with the development of management techniques rather than technology. However, it was out of many of the ideas of Taylorism that the modern production environment developed. Taylor's basic tenet was that " The principal object of management should be to secure the maximum prosperity for the employer, coupled with the maximum prosperity for the employee." He argued that this could be accomplished by:

i. defining what is meant by a 'fair day's work' so that employers and employees knew where they were,

ii. selecting and training every worker so that they could operate and earn at the highest rate of which they were capable,

iii. use work analysis as a means of establishing the work content and work rates for jobs, and,

iv. managers and workers sharing work and responsibility on an equitable basis.

The concept of maximum specialisation for both workers and managers as a prerequisite for process output maximisation was widely misunderstood at the time. Critics of Taylor pointed to the production sweat shops in which work was reduced to trivial elements that were boring and for which workers were very poorly paid. In fact this criticism is more of the owners of these enterprises rather than Taylor. A more realistic criticism of Taylor is his naive view that managers would behave fairly in distributing their profits when they had an abundance of cheap immigrant labour who could do the simple tasks that came about as the result of work analysis. Others in the 'work analysis' school of thinking included Gantt, Gilbreth, Bedaux, Rowan and Halsley. They laid down the principles and practices of what is now known as industrial engineering and production engineering.

At the same time as Taylor was developing his ideas (circa 1880 - 1900) American industry was already developing methods for producing in large quantities. Lacey (1986, p.88), when describing the early manufacturing activities of Henry Ford, writes of mass production as being a "long established tradition in American industry: Singer sewing machines, McCormick reapers, the small arms manufacturer Samuel Colt". It was to this tradition that Ford looked when he began to design the production system for the model T Ford motor car in 1906 and it is clear that Ford was not, as some people have suggested, the inventor of the production line. Ford's real innovations were twofold. The first was that he succeeded in refining control of the supply chain to the extent that he could build a motor car, from mining ore to final assembly, in about 30 hours. The second was that he managed to control the cycle times within the process accurately by designing the work content of individual work stations to be balanced throughout the whole system. Through these innovations Ford produced an attractively priced and durable motor car every 2 minutes for a market that was rapidly growing.

Both Taylor and Ford have been heavily criticised by more recent writers for reducing workers to 'mindless machines'. In truth, a careful reading of Taylor's work shows that he believed that people should have meaningful work and that specialisation should be a way of enriching work. The same is true of Ford (1929) who professed a sincere belief in the humanity of the worker and the need for the worker to be a 'thinking being'. A more realistic criticism of Taylor and Ford is that their individual belief systems were rooted in a unitary view of life (managerial determinism) and that they failed to involve work people in the management process (pluralism). These differences were crystallised by Matthews (1989) and are shown in Table 2.3.

| | **Unitary point of view** | **Pluralist point of view** |
|---|---|---|
| **Management assumptions** | Workers cannot be trusted and must be controlled by a supervisory hierarchy | Workers desire challenging work and want to make a contribution |
| **Management structures** | Top down hierarchy of command with workers simply obeying orders | Flexible and flat decision structure with an emphasis on co-ordination and control based on project teams |
| **Job design** | Work is fragmented and de-skilled; jobs narrow; conception is divorced from execution | Work is integrated vertically and horizontally; multi-skilled and performed by teams |
| **Skill formation** | Skills are bought from an external labour market. Workers are replaceable and are made redundant at an economic downturn; jobs are defined by operations and machines | Skills are nourished by an internal labour market; job security and training are a part of the employment package; jobs are defined by skills |

(Source: Matthews, 1989)

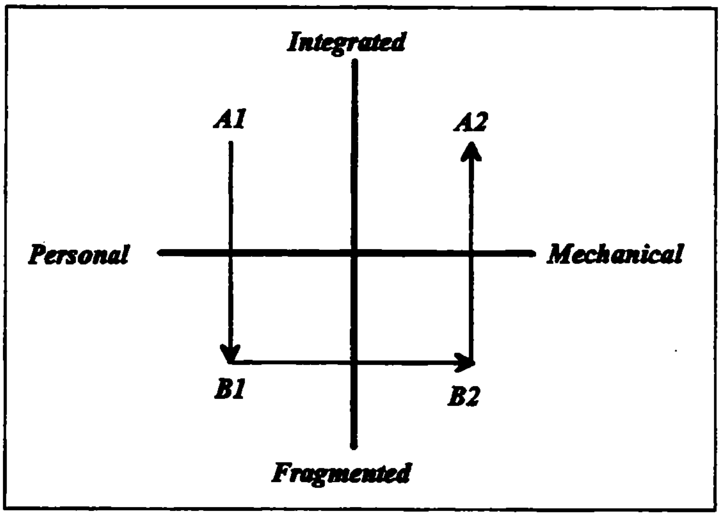
**Table 2.3 A comparison of Unitary and Pluralist management beliefs**

In forming these divisions Matthews projected an idealistic and rather extremist view of unitarism and pluralism for the sake of effect. The reality of industrial and commercial life is that a balance is struck between these two extremes in which managers and workers achieve reasonable outcomes. The exact balance at any point in time is usually a reflection of wider issues than those contained in the relationship between workers and managers in a single organisation.

It seems to be reasonably clear that most of the early industrialists did not set out to use technology as a philosophical (and practical) tool to dominate workers. In these early industrial days technology was a means to an end, and that end was the satisfaction of market demand. It was not until much later in the late 1950s that academics became really interested in the relationship between technology and work.

Joan Woodward a sociologist by profession and her teams of researchers at South - East Essex Technical College, and later at Imperial College, are credited with opening the debate on technological determinism in the management context. Woodward (1958) lead her team in an investigation of a hundred firms in the Essex region. In examining the organisations they sought to identify the relationships between organisation size, number of levels of management, the span of managerial control at each level, the ways in which work role are defined, the nature of and amount of written communications, and the extent of the divisions of functions among specialists. In addition they investigated the histories of the companies to seek out causal relationships. The results of these investigations were inconclusive until they examined the technology the companies used. Then they found that there was a relationship between the objectives of a company (defined as what they make and for what market) and the technology (defined by the production system) they used. Woodward never claimed that this was a definitive or an exclusive relationship, only that it seemed more consistent than other relationships in organisations. The Woodward classification identified three types of production system - unit and small batch, large batch and mass production, and, process production. These production systems had increasing levels of complexity in technological terms and Woodward concluded that to be successful management had to adopt an appropriate kind of management control system. Reeves and Woodward (1970) eventually published this proposition as a management control typology illustrated in Figure 2.6.

They suggested that firms who had a unit or small batch production system would most likely be successful if they adopted a control system that had an integrated and personal characteristics (position A1); firms that had large batch or mass production would most likely be successful if they adopted either a personal fragmented or a mechanical fragmented control system (positions B1 and B2); firms that had process production would be most likely to be successful if they adopted an integrated mechanical control




Source: Reeves & Woodward (1970)

**Figure 2.6 Types of Management Control System**

system. [The term *integrated* implies control by a central authority; *fragmented* control by individual departments; *personal* control by some one; and *mechanical* control by procedures or technical devices.] While Woodward's work undoubtedly moved the debate about technology on, it was criticised as being too simplistic by several contemporary and subsequent researchers (e.g. Dawson and Wedderburn [1980], Wilkinson [1983], Silverman [1970] and Rose [1988]). These criticisms centred on three issues. The first was Woodward's lack of exploration of the wider social issues that affect the work place; the second was that the role of management in the selection and application of technology was largely ignored; and finally that Woodward did not explore the divisions of opinion that existed between management and work people with respect to technology and assumed some kind of consensus. However, it is worth noting in passing that research in the adjacent academic field of operations management by Platts and Gregory (1990), Hill (1993), and Slack (1995) all identify technology as a major factor in a successful operations strategy. Also McLoghlin and Clark (1994) make the point that the recent development in the application of computer technology to the automation of organisations is tending to support Woodward's contingency view of organisations and her prescription for effective managerial styles in relation to the type of technology being used by an organisation.

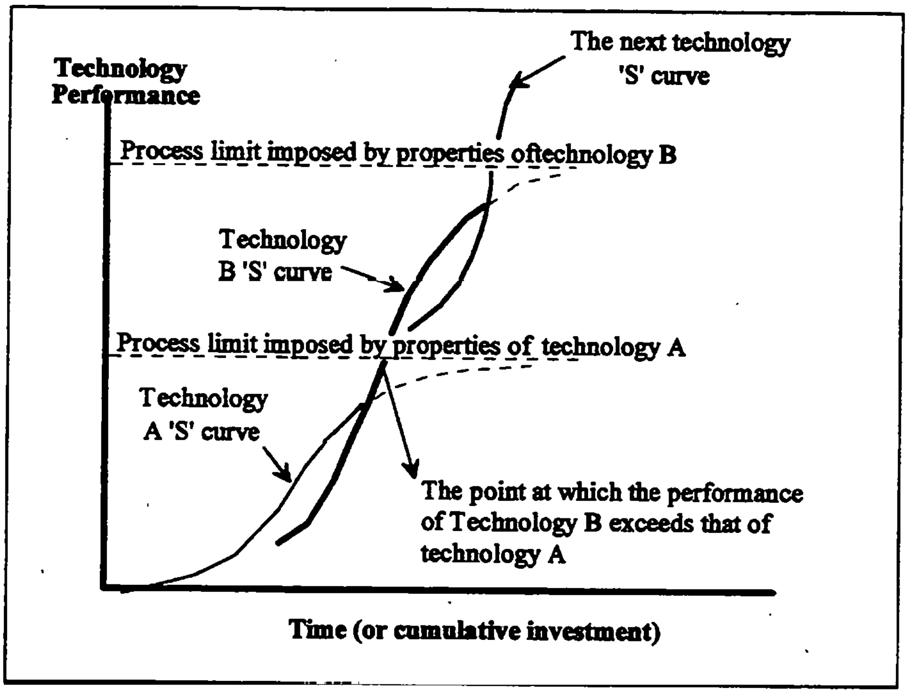
There is no doubt that Woodward's work was something of a milepost in organisational research and her work seems to have stimulated several other aspects of organisational analysis. Research by the Aston Group (Pugh, 1976 and 1977) focused on a multivariate analysis that sought to understand the relationships that exist between the ways in which an organisation is structured and functions, the ways in which groups interact within an organisation, and the ways in which individuals act and behave. Their approach was rooted in the work of Weber (1947) and Fayol (1949) that examined the nature and extent of bureaucratic influences within organisational power structures. The Aston Group came to two fundamental conclusions. The first was that the contingency approach (isolating factors such as technology, ownership, etc.) did little to explain the way in which organisations worked. The second was that organisation size and dependence upon other organisations had a great effect upon organisational structure, particularly in the level of specialisation encountered and the nature of the bureaucracies observed. In respect to this latter factor the Aston Group refined the taxonomy of bureaucracy to include four major categories that were defined in terms of the concentration of authority and the ways in which the activities of the organisation were structured:-

> ***workflow bureaucracies***, typically found in large commercial organisations, in which the concentration of authority was low but activities were highly structured;
>
> ***personnel bureaucracies***, found in public sector organisations, that were not highly structured in a global sense but which focused on personnel activities (e.g. hiring and firing) and had highly concentrated authority;
>
> ***full bureaucracies***, found in smaller units of larger organisations, with high work flow structuring and highly concentrated authority; and, non-bureaucracies, typically found in small organisations, in which the concentration of authority is low and the structuring of activities is low.

The importance of the Aston work is two fold. The first is that it was based on relatively large sample sizes and sound statistical techniques. The second was that it confirmed that the holistic approach to researching organisations gave sensible outcomes. Although the Aston work can be criticised as being high on description and low on prescription, in practice it validated the work of previous researchers (e.g. Weber and Fayol) who had approached the research of organisations in a phenomenological and holistic manner. In this latter respect they were implicitly to criticise the approach taken by Woodward and the contingency school of thought as being too simplistic. Even so, the Aston Group did not entirely ignore or negate Woodward's work. Hickson in particular (an important member of the Aston Group) maintained that a specialist department's influence on an organisation was proportional to its knowledge and skills (Hickson et al, 1971), and this is clearly an observation that can be linked to the contingency philosophy.

Other research into organisations took different paths: the organisational environmentalists (e.g. Burns, [1966], Lawrence and Lorsch, [1967], Hannan and Freeman, [1988]) took the view that organisations were shaped by their market environment rather than shaping their market environment; the managerial structuralists (e.g. Simon [1960], Cyert and March [1963], Vroom and Yetton [1973], Tannenbaum [1968]) sought to understand organisations in terms of management structures, styles and decision making; and, the humanists (e.g. Mayo [1949], McGregor[1960], Argyris and Schon [1978], Herzberg, Mausner and Snyderman [1959], Fiedler [1967]) who explored the organisation in terms of people and their need for meaningful relationships and motivation. In spite of all of these alternative approaches to analysing organisations the issue of technology and its influence on organisations did not die. It has returned in several organisational contexts. Twiss and Goodridge (1989) examined technological change in the context of its role in maintaining competitive advantage. They suggested that: technological change, as a part of a strategy to improve competitive performance, should not be managed solely by technological specialists - to do so would lose a balanced view that took wider market and commercial issues into consideration; innovation (technical change) must be pursued as a part of cohesive strategy designed to encourage an organisation to improve and renew itself; technological change in an organisation must be planned in relation to all other systems within an organisation and managed by multi-functional teams to avoid organisational bias or distortion; a critical factor in the success of organisations is its ability to capture and transfer technical knowledge to its employees; people in an organisation should have a common language that embraces, among other things, the technology that an organisation uses; that technical change cannot be divorced from organisational change; and finally that cultural and organisational changes are more difficult than the mechanistic aspects of technical change.

The suggestion that organisations need to change technology to maintain market competitiveness was hardly new. These ideas built on previous arguments forwarded by Fisher and Pry (1971) and Twiss (1986). This previous research linked technology used in processes to the market maturity 'S' curve (widely used to describe product life cycles in the marketing context). Twiss in particular suggested that the product life cycle was inextricably linked to the technology used in a process. As the technology ages so the process becomes less efficient in relation to similar processes that use newer technology. In turn this gives the newer processes a competitive edge as time goes on (even though they may not be quite so competitive at the early part of the new process life cycle), leading to the decline of the older process. This is illustrated in Figure 2.7. The natural corollary of this conjecture is that to remain competitive an organisation must constantly watch new technological developments insofar as they affect their processes, and change technologies at the appropriate time within the process life cycle in order to maintain a competitive edge. Clearly these authors are bridging the gap that had emerged between Woodward and Pugh by showing that strategy and performance are constrained by technology and that changing or developing technology can liberate strategy and enhance performance.




Source: Twiss (1986)

**Fig. 2.7 Changing technologies and the 'S' curve**

In addition to the impact of technology on organisations in a corporate sense, it is clear that technology has had an impact on managers and the process of management. Historically the role of managers has been to plan work, organise resources, motivate people and to control processes. In this role the manager has been the primary conduit of information within organisations. In the past, information has largely been transferred either in writing or by word of mouth. By controlling these communications management have been able to maintain their hierarchical situation and power. However, with the advent of cheap computing, powerful software, enhanced communication systems and automation, these traditional roles have progressively changed.

In manufacturing environments nearly all of the traditional management roles, with the exception of people motivation, can be done by integrated computer software such as Manufacturing Resource Planning (MRP II). Technology, and computer technology in particular, has given managers greater access to information within and about the organisation. In turn this has given the individual manager the opportunity to improve their effectiveness and efficiency. Computer hardware has got cheaper and more powerful, and at the same time this increase in processing power has allowed more and more sophisticated software to be written (Bell, 1985).

Clarke et al (1988) identified other integrated software and/or automation systems in a wide variety of other environments. In design and manufacture: Computer aided design and drafting (CAD); Quantitative analysis; Interactive computer graphics; Computer aided manufacture (CAM); Computer numeric control (CNC); Robotics; Flexible manufacturing systems (FMS); Computer integrated manufacture (CIM); Computer aided design and manufacture (CAD/CAM); Computer aided production planning (CAPP); Computer aided measurement and test (CAMT); Materials requirement planning (MRP); Just-in-time & Total quality management (JIT & TQM). In administration: Real time management information systems (MIS); Word processors and personal computers (PC's); Intelligent knowledge based systems (IKBS); Expert systems; Telecommunications & electronic mail; Viewdata and on-line databases; Private automatic branch exchanges (PABX); Local and wide area networks (LAN & WAN); Broadcast (optical fibre broadband communications). In Finance: Automated telling machines (ATM); Electronic funds transfer (EFT); Itnegrated circuit 'smart' cards. In retailing: Electronic Point of Sale (EPoS); Electronic Funds Transfer at Point of Sale (EFTPoS); Electronic Data Interchange (EDI); Distribution Resource Planning (DRP); Direct Product Profitability (DPP). As these systems have developed they have permitted progressive automation of aspects of work in different enviroments. Beginning with the automation of hand work (e.g. robotisation), proceeding to the automation of the integration of hand work (e.g. CAPP), then to the automation of administrative work (e.g. Expert Systems), on to the automation of the integration of administrative work (e.g. EDI), and finally the automation of management decision making (e.g. FMS).

The progression of automation has extended the impact of technology from being only a shop floor and administration phenomenon to affecting every level in an organisation. It has made possible radical restructuring of organisations in their entirety. Business Process Reengineering [BPR] (Hammer and Champey, 1993; Davenport, 1993, Scott-Morton, 1994), uses the integration of corporate data in computer systems as the mechanism for replacing traditional hierarchical management structures with flatter structures, less bureaucracy and lower organisational inertia. Within the BPR concept the process becomes focused on the customer and process control is achieved through integrated computer systems with common access by a broadly skilled work force. Within the philosophy of BPR the old concept of managerial power by virtue of position and control of information is replaced with power that is 'earned' or 'normative' and which is gained through the efficient servicing of an empowered team who control the process. Oram and Wellins (1995) argued that because this management power is normative managers in BPR organisation have more rather than less power. A comparison of traditional and BPR management structures is illustrated in Figure 2.8. The range and complexity of technology used in all organisations is increasing and can present a challenge to management. Campbell and Warner (see Wild, 1990, pp 111-121) suggested that as process automation and computer technology becomes more sophisticated people who design, maintain and control the technology used by an organisation take some control away from managers (de facto if not de jure). This

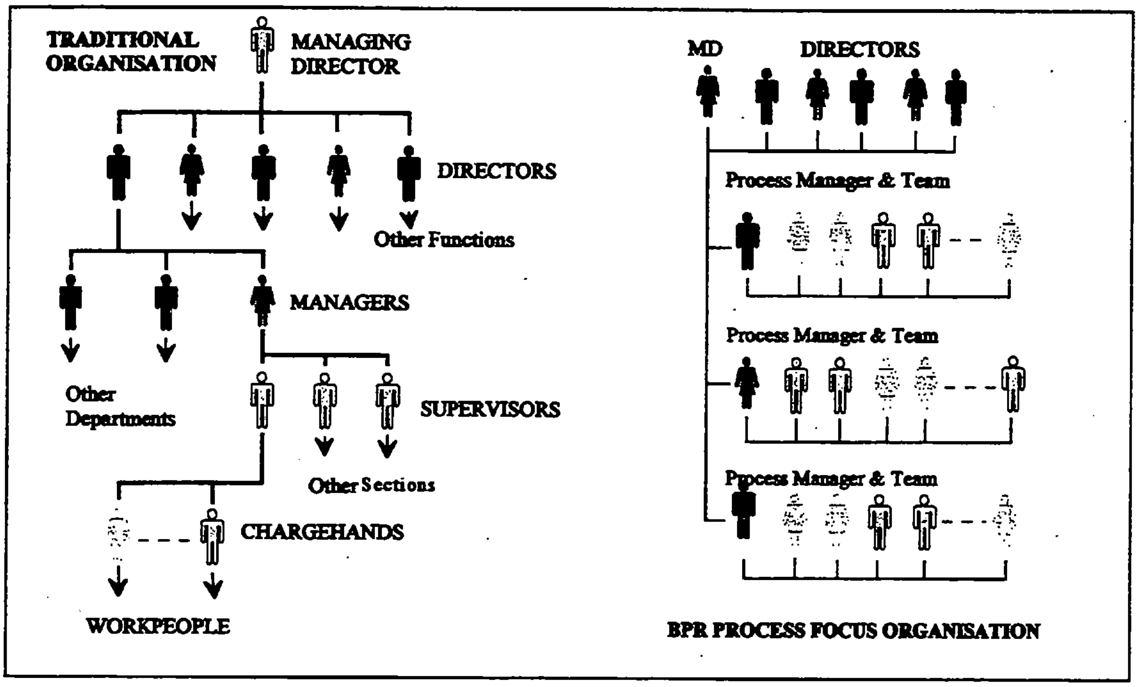
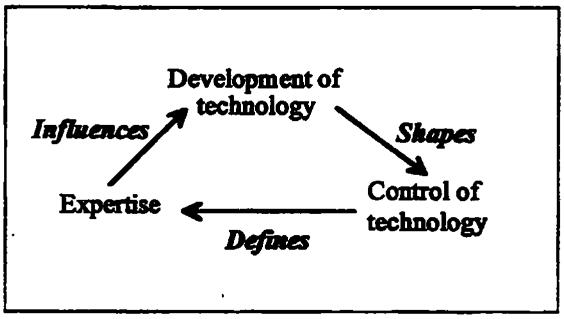



**Figure 2.8 Traditional and BPR management structures compared**

control, nominally residing with the technologists, unless suitably directed, may cause the technological systems to become dysfunctional and fail to meet the organisations objectives. This problem can be overcome if managers acquire sufficient technical knowledge to communicate effectively with technologists and conversely that technologists do not use technical jargon. Rothwell (1984) and Handy et al (1987) observed that in the short term the challenge of maintaining good communication between manager and technologist can only be overcome by training managers to understand the technology; and that in the long term they are likely acquire technical expertise before they move into management roles. Clearly the issue of the balance of power between the manager and the technologist is of great importance. Scarborough and Corbett (1992) suggest that it is creating a professional interdependence that is influencing options for change in organisations. They call this phenomenon the Technological Power Loop and this is illustrated diagramatically in Figure 2.9. It can be seen that unless managers can effectively contribute to the loop they will not be able to exert the necessary influence on technological development. However, it should be borne in mind that management are rarely bystanders in the process of introducing new technology, and it is their responsibility to ensure that the priorities and purposes of their organisation are well served (Childe, 1985).

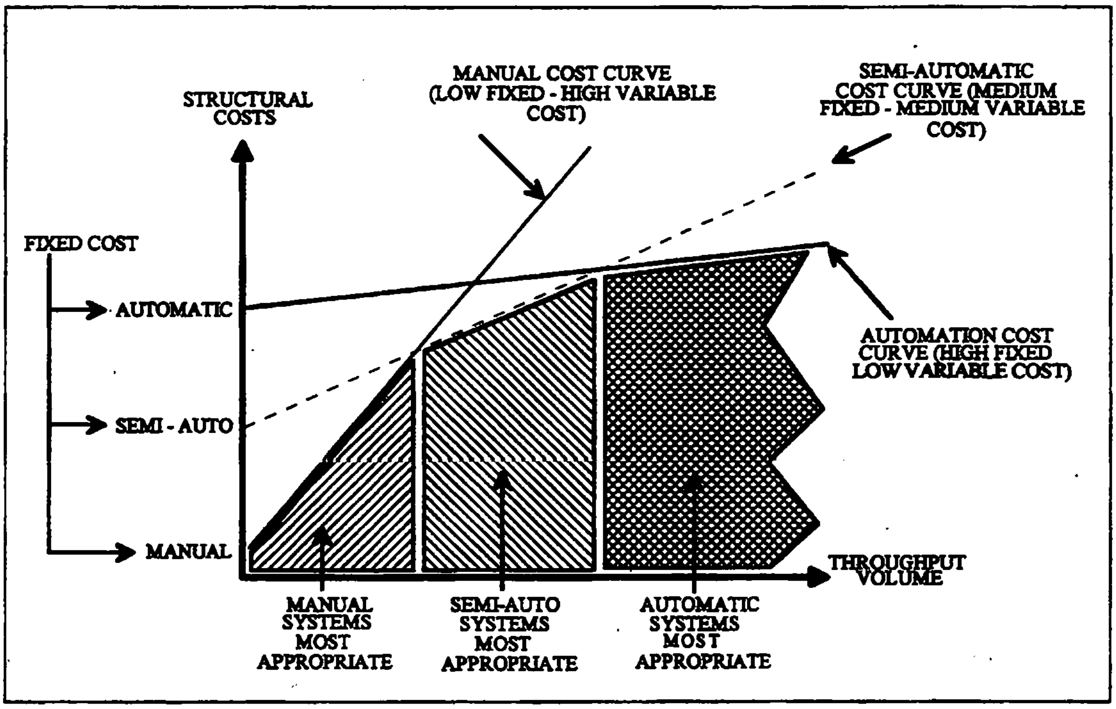



Source: Scarborough & Corbett, 1992, p. 46

**Figure 2.9 The technological power loop**

Whatever problems and opportunities technology offers management, workers have related problems and opportunities. Technology is often blamed for many organisation problems and can be a convenient scape goat for inept management. It is often management's lack of marketing ability, organisational skills and vision that causes company failures rather than technology.

While technology has often been blamed for the reductions in manufacturing manpower, the reality of the situation is more complicated. At the macro level the decline in the manufacturing work force has resulted from several factors. In part the decline has been due to a reduction in the overall number of manufacturing companies - because they lost markets by being uncompetitive; in part because many of the clerical and bureaucratic jobs have been replaced by computer systems; and in part because of wider demographic changes - an overall reduction in younger people choosing manufacturing as a career. In the successful manufacturing companies that have survived, investment in technology has been a key strategy in improving productivity and competitiveness. For the operator this has meant that new skills have had to be acquired and new working patterns adopted to accommodate new technology. It has also meant that the growth in the complexity of manufacturing technology has been matched by a growth in people needed to programme and maintain systems and equipment. The more complex the system the more the organisation relies on these 'technocrats', and of course the more relative power they have. If a manufacturing organisation does not have a growing market place, then technology can mean unemployment as fewer people are needed for the same output. In this case, Wild (1995) suggests the overall pattern will be for the migration of skilled operatives to smaller organisations that still retain manual or semi-automatic labour intensive methods of production. This cycle is driven by relatively simple economics that are governed by the volume of throughput and variety of products made or services provided (Hayes and Wheelwright, 1984). At low volume production the pattern of production is characterised by a wide variety of work, a large number of changeovers between batches, single purpose machines (e.g. manual or semi- automatic lathes or milling machines), and a highly skilled and flexible blue collar work force. As the volume of production increases so the variety of work and number of batches and changeovers tends to drop. It becomes more economic to use more sophisticated machinery (e.g. machining centres), and because the machinery can be programmed away from the workplace by white collar technologists, blue collar workers with a lower level of skill (in the craft sense) are required - but with a wider of ancillary skills (e.g. more responsibility for quality control). Ultimately as volumes increase the use of automation and sophisticated line oriented production systems become economically necessary. In these systems blue collar skills are usually low but the supporting white collar technological skills are usually high. This natural migration pattern is illustrated in Figure 2.10.




(Adapted from Wild 1995, p80)

**Figure 2.10 Throughput volume and technology relationships**

Similar patterns of change have been observed in white collar organisations such as banks, insurance companies and stockbroking. In these and similar environments, technology, and in particular computer technology, has been one of main engines of change. Computers are particularly suited to repetitive bureaucratic tasks such as data collection, processing and retrieval. As small computers have become less expensive and more powerful (Table 2.4) they have become widely used as intelligent terminals connected to mini and mainframe computers or as stand alone processors. Better and more powerful software allows these small computers, or Personal Computers (PC) as they are widely known, to perform an increasingly wide variety of tasks. Functionality within software has improved and off-the-shelf software can perform the majority of office functions such as word processing, database work, spreadsheets, drawing and presentations, etc. The microprocessor has also been at the centre of white collar automation with the use of Automatic Telling Machines in banks, and changes in the organisation structure such as those discussed in relation to BPR. In spite of the

| Micro- processor | 8088 | 80286 | 80386 | 80486 | CPU Pentium |
|---|---|---|---|---|---|
| Date of introduction | 1981 | 1984 | 1988 | 1990 | 1996 |
| Normal RAM (max) | 640 kB | 4MB | 16MB | 32MB | 128MB |
| Floppy disc | 720kB | 1.4MB | 1.4MB | 1.4MB | 1.4MB |
| Fixed disc (normal) | 10MB | 30MB | 300MB | 500MB | 5GB |
| Internal clock speed | 4.88 MHz | 10MHz | 20MHz | 66MHz | >200MHz |
| Relative power | 1 | 5 | 10 | 25 | 100 |
| Unadjusted cost | £1500 | £1200 | £1000 | £1200 | £1000 |

(Adapted from: Bell 1990, 128; IBM PC Specification, 1996)

**Table 2.4 PC comparative performance data**

proliferation of office computers automation has not really made a serious inroad into the face-to-face service encounter situations. It seems that people still wish to interact with people when they go to the doctors, lawyers, hairdressers. However, the people who provide these services are relying to an increasing extent on computers to access information about treatment, personal records, and so on.

If technology is changing how we organise work and work people it is also changing the nature of the overall organisation in the way it manifests human values. Where people are located and their surroundings were a metaphor of perceived status and power in an organisation. As people moved up the hierarchy so they often moved to higher floors in office blocks and the trappings of their office grew more lavish. In the civil service it was possible to determine the seniority of a person by the size and quality of their carpet. In commerce a persons status could easily be determined by the size of their company car and the limit of their expense account. Technology is beginning to break these traditional differentials down and even create new status symbols itself. It breaks the traditional status symbols by creating the possibility of new work patterns, for example home working or remote working. Here the need for offices may be reduced to a small building in which there are a collection of meeting places in which people meet clients or colleagues. A current example of this is Directory Enquiries in British Telecommunications (BT), where a large number of operators are based at home with a PC, a compact disc database of telephone numbers, and a BT network connection. Enquiries are automatically routed to a free number in the network. Other than for appraisal, training or face-to-face encounters the enquiry operators may never go to a BT office. Technology is also becoming a symbol in itself. For instance in many organisations the type and power of a person's PC, together with the level of security access they have in large systems, is set by seniority.

What may be concluded from this review is that in many modern organisations technology is a part of a complex web of relationships. The more complex the technology becomes and the more it replaces the activities of managers and work people the harder it seems to define in a concise way. Individual pieces of equipment are often required to comply with the requirements of surrounding equipment, and while unconnected do not remain unaffected by this equipment. For example a PC when unconnected with a system is ostensibly a well defined stand alone piece of technology. However, if any output from that computer is to be transferred to a system then it must comply with the system input requirements. The same would be true if a worker or manager wishes to communicate with a computer system. They also have to taught to interface in an effective way. The reverse is also true and the design and development of the systems require man-machine interactions to be well defined and achievable in normal operational environments with a wide variety of users.

In many advanced systems, as is the case with the multiple food retailers, the systems are so pervasive that the organisation could not function without it's technology. In these cases it becomes difficult to unravel precise boundaries and consequently the conventional concept of technology defined as individual pieces or even connected pieces of equipment becomes tentative. What is required is a broader concept of 'system' and just such a concept has been suggested by Wild (1990, p.109):

> "... technology is a systems concept. It is not a simple dimension, but rather a cluster or matrix of things: materials, processes, software, practices, etc. The extent and manner of the usage of new technologies may be different in each part of the organisation. The rates of change may differ. Furthermore, each part of the organisation, i.e. companies, departments, divisions, sections, areas, etc., may be run in a different manner, and may relate differently to technological change. So there can be no simple 'rule of thumb' to relate

> technology to organisation. For this reason, as managers or technologists we can only realistically hope to be aware of some things that might influence the relationship and some of the common features of the relationships, in order to be able to adequately deal with that part of the organisation in which we are involved or for which we are responsible."

On this basis it is unlikely that any investigation into the relationship between technology and strategy will be simple or even definitive. What must be examined are basic relationships - man / system, technology / system and strategy / systems - and from these it will be possible to gain a reasonable understanding of the technology / strategy dynamics in the food multiples.

Clearly these relationships are important as they help in the understanding of organisations. However, technology in the form of operations monitoring systems are also of great significance in the retail environment. The next part of this chapter therefore, considers the evolution of performance measurement in organisations.

### *2.4 Performance Measurement*

The issue of performance measurement is critical for many organisations. Having set both strategic and tactical targets management must know what progress is being made and the organisations performance measurement systems (PMS) are what enable this to be done. In recent years, as new ideas about how organisations work and how they should be organised have emerged, especially in the operational aspect of organisations, PMS have increasingly been challenged. Morgan (1996), in describing Business Process Reengineering as a radical approach to change, was not alone in crystallising problems with PMS. Oakland (1995) identified the problems of PMS in the Total Quality Management (TQM) context, Harrison (1992) in the Just in Time (JIT) context, and Luscombe (1993) in the Manufacturing Resource Planning (MRPII) context. To suggest that these radical approaches are solely responsible for highlighting problems with PMS would be misleading. For some time the traditional concepts of performance measurement, rooted in Management Accounting, have been challenged by accounting professionals and academics alike. In the mid 1980's Johnson and Kaplan (1987) drew several contemporary arguments together to demonstrate that traditional organisational performance measures either had lost, or were rapidly losing, relevance to modern organisations. They argued that the traditional performance measures were rooted in the industrial revolution and reflected a control system for radically different markets and organisations to those found in modern society. To continue to use these methods of measuring performance was to shackle modern management with an unwieldy set of tools that - decreases managerial productivity because of the time needed to gather, process and present information (often on relatively unimportant factors); fails to provide accurate product costs because of the averaging process used to allocate costs and overheads; and, finally, encouraged managers to take a short term view of the business that is frequently distorted due to the mix of long and short term spending requirements. What seems clear is that while historical information forms the basis of a PMS it is difficult for managers to avoid reactive behaviour. The underlying reason for forming a PMS on historical information is that this data is usually gathered as a side effect of normal trading activities. For example the data gathered in most financial systems, when

| Financial | Operations | Marketing | Quality |
|---|---|---|---|
| Creditor days | Ops. lead time | Market share | % rework |
| Debtor days | Inventory | Orders on hand | % rejects |
| Dividend cover | Stock turn | Order lead time | % conformance |
| Stock turnover | Set-up time | No. of complaints | % scrap |
| P:E ratio | Labour utility | New product intro. | Qual. admin. costs |
| Net asset turnover | Machine utility | Repeat orders | Recall costs |
| R.O.C.E. | Work in progress | Delivery perf. | Liability costs |
| R.O.E. | Employee t.o. | Time to market | Perf. penalties |
| Current ratio | Direct Product'ty | Warranty claims | % errors |
| Gross profit | Indirect product'ty | Returns | Prevention costs |
| R.O.O.A. | Supplier perf. | Service visits | Qual. tr'g costs |
| Return on sales | Variances | First pick % | Product testing |
| Sales / sq. m. | Process time | First drop % | Perf. testing |
| Gearing | No. of accidents | Transport utility | Laboratory costs |

**Table 2.5 A selection of traditional historic performance measures**

processed, forms the basis for performance reporting required and is used by the banking, investment and share holding fraternities. The value of this data for proactive management is small, it does however provide a yardstick to judge how closely management have been able to manage to their declared strategy. It also is a consistent standard across many different organisations. Other historical data may be gathered in non-financial areas of the organisation and Table 2.5 is a sample of the kind of performance measures that may be found in many manufacturing and service organisations.

Leaving the financial measure in Table 2.5 aside (because arguably they are so entrenched that they would never be replaced), it is useful to examine the other performance measures to see how good they really are in terms of helping management to adopt a proactive posture. In most cases it must be said that the item measured will trigger a management response that will be too late in terms of either the internal or external customer. This of course raises two important questions -

a. what is a good performance measure? and,

b. what system of performance measurement is most likely to produce conditions conducive to proactive management?

Neely et al (1995) identify no less than 22 qualifications defining a performance measure's 'goodness'. They include a clear link between the performance measure and the organisation strategy; being simple to understand; being able to be controlled by the either the person doing the measurement or their close associates; being defined by the supplier and the consumer; providing timely and accurate feedback about realistic targets; being clearly defined and visible; be a part of a feedback loop and be presented in a clear and consistent format; data should be presented in terms of trends rather than absolutes and in terms of information rather than opinion or raw data; being based on an agreed understanding of what is being measured; and, if possible use data that is automatically gathered as a part of the process. Clearly the issue of 'goodness' as applied to performance measures is far from simple and this explains, at least in part, why many organisations feel the need to invent their own non-financial performance measures.

The second of these questions has evoked a series of alternative approaches to PMS. These alternative systems have tried to break the stranglehold of the traditional PMS with varying degrees of success. Goldratt (1984), a physicist originally, and used to logical physical systems of measurement, was unhappy with the imprecision of many concepts and words used in conventional cost accounting systems. The word 'cost' in particular he found had many meanings that changed and overlapped - investment cost, operating cost, absorption costs, opportunity cost, variable cost, fixed cost and product cost. Claiming that this kind of nomenclature only confused most managers, he suggested that the most productive approach was to concentrate on the process itself and use measures that concentrate on physical rather than financial items. This approach led to the Theory of Constraints (TOC) and the concept of managing the process constraints, or bottlenecks, effectively. By concentrating on increasing throughput - defined as the value taken only at sale of a product or service - decreasing operating expenses (fixed costs) and decreasing investment (reducing inventories), he argued that profitability will increase. Certainly Throughput Accounting (TA) is conceptually simpler than management accounting in that it treats direct labour and variable overhead, conventionally defined, as an operating expense. If this makes it more accessible to managers so much the better.

While Goldratt and his subsequent interpreters concentrated on the underlying metric problems of management accounting, they are still operate within what is a fundamentally unitary concept of management. Once the need arises to define performance in other than readily measurable terms, and this is often the case in service environments and with service strategies, the magnitude of difficulty rises. Kaplan and Norton (1992) and subsequently Kaplan (1993) suggested that a PMS needs additional vectors that reflect the wider environment in which organisations exist. These were customer related measures that seek to define what a customer values from an organisation; internal global process measures that seek to measure the effectiveness of the organisation in meeting its' financial objectives; learning measures to examine if an organisation can develop in order to create future value; and, measures that test whether an organisation is creating value for its' shareholders. Kaplan calls this approach to PMS the 'Balanced Scorecard', and if nothing else it does represent a move towards a pluralistic view of the organisation. These view was reinforced with respect to the service sector by Armistead (1994, p.11) who wrote:

> "... It is necessary to establish the standards of performance for each of the customer service dimensions either with quantitative expressions for firm dimensions (*tangible aspects of the services*) and qualitative descriptions for the soft dimensions (*intangible aspects of the service*); these are effectively the quality standards for the service package(s)."

Kaplan and Cooper (1987), like Goldratt, were also uneasy with some of the traditional approaches of management accounting to costing. They argued that indirect costs ought not to treated as global quantities but needed to be analysed accurately and apportioned to the cost profile of those activities in an organisation that use the overhead. This overall approach is called Activity Based Costing (ABC) and has attracted much interest. Maskell (1991) in particular suggests that one of the strengths of ABC is that it allows for flexibility, complexity and continual improvement - features that are important within the context of organisational change philosophies.

To some extent the debate about the validity of the management accounting approach is irrelevant to PMS. Whatever management accounting system is used (traditional, new, or, yet-to-be-invented), the important issues are: whether or not the PMS supports an organisation in its current activities in a consistent and reliable manner; whether or not it will retain validity with the passage of time; whether or not it provides management with a balance of information that is relevant to the organisation's activities; and finally, whether or not management use the information it provides in a proactive as well as a reactive way.

The PMS issue has been of central concern to the retailers as they have developed. The role of technology in the evolution of their PMS will be discussed in Chapter 6. Meanwhile the literature review continues with an examination of distribution systems - an issue of central importance to all multiple retailers.

## *2.5 Retail distribution systems*

### *2.5.1 The development of retail distribution systems since 1850*

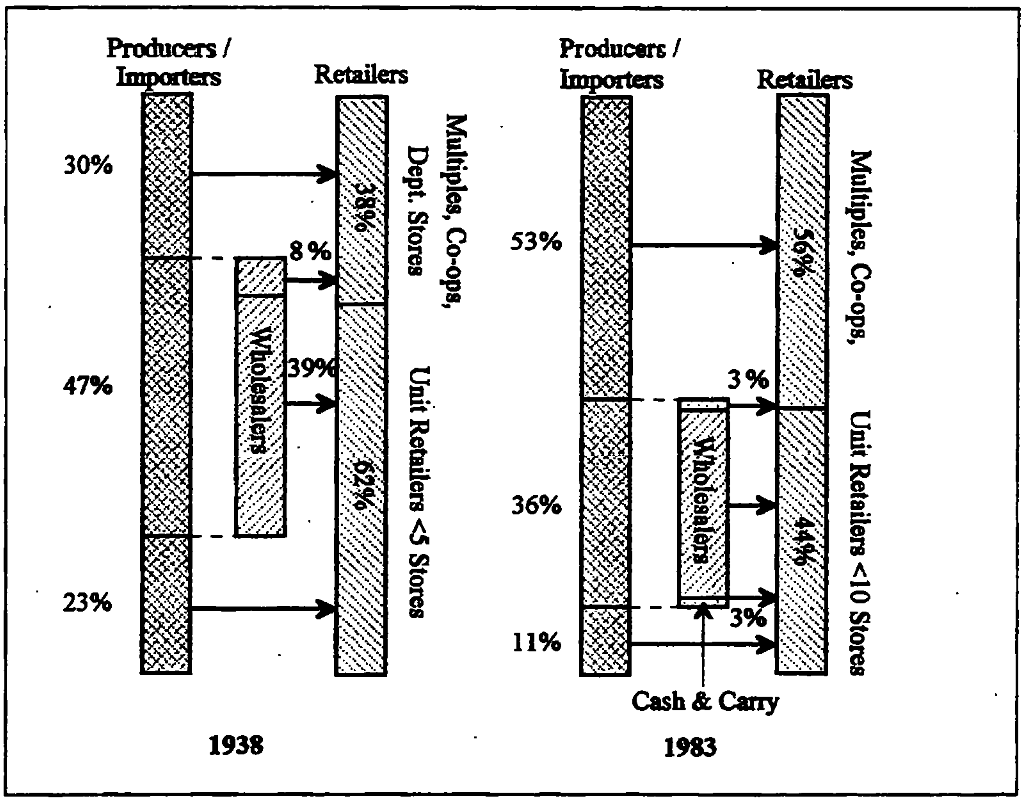
Although the development of trading and distribution systems can be traced back to the emergence of the civilised world at about 5000 BC. in Mesopotamia, the period of relevance to this research is from the 1850 onwards, for about this time John Sainsbury began trading in London. The traditional wholesale channels of distribution in the towns and cities, which had been in operation for several centuries, had been growing to accommodate a widening variety of produce coming to the market. Winstanley (1983) points out that in 1850 the traditional markets with their itinerant traders still flourished, that the preponderance of shops were trading from converted ordinary houses with very few retailers owning more than one shop. Up to 1850 the wholesale distribution network had serviced the needs of this traditional single shop retailer, but by the late 1800s the emergence of the food retail multiples required a significant adjustment of the supply channels. With enhanced buying power the multiples demanded fresher produce, quicker delivery and argued aggressively for volume discounts. Some even set up supply channels to service their own shops where existing wholesale arrangements were inadequate (Williams, 1995).

Early food multiple growth is best understood in the contexts of convenience for the consumer and value for money. The location of shops was important for an expanding town and city population who usually lived near to their place of work. Often the only means of transport for these work people was foot or bicycle, and convenience in terms of geographical location and long trading hours was essential. To meet these needs the early multiples often expanded their geographical coverage by taking over ordinary houses in the locality of their customers and converting them to shops. These shops were often situated a few streets away from one another and could be easily serviced by horse drawn transport. This network offered the consumer a consistent shopping format and product range. Very often these multiples specialised in a specific food range that was augmented by ancillary products. J. Sainsbury for instance began by specialising in dairy products and augmented these core lines with cooked meats and some prepared butchery items. The combination of a convenient shopping location, bulk buying and often a self controlled distribution system gave the food multiples a cost advantage over the traditional single food retailer who had to buy through wholesalers (Fulop, 1964). Entrepreneurs such as Lipton and Sainsbury were quick to exploit these advantages by building retail empires that quickly spread from local to regional or national networks of shops and traded on a formula that offered the customer quality produce at competitive prices (Jeffreys, 1954).

The food multiples did not have unopposed growth. When the independent retailers began to lose custom to the multiples they formed collectives in order to improve buying power and trading margins. These collectives established their own distribution chain with exclusive wholesale functions. However, uneasy administrative relationships and the inevitable tension between entrepreneurially oriented individuals often meant that these retailer / wholesaler organisations often disintegrated into their component parts. This is not to suggest that the collectives disappeared or were wholly unsuccessful. Some still exist today. SPAR and MACE are examples of independent retailer collective organisation, the Co-op an example of non-independent retailer collective organisation. In addition to the retailers organising to defend their market share some wholesalers also responded to the threat of the multiple chains by opening their own retail outlets. A non-food example of this latter phenomenon is Halfords who began as a wholesaler of ironmongery and bicycle parts and grew to be a successful retailer (Jeffreys: 1950, Jones: 1982).

The constant jockeying for position between the independent food retailers, the multiple food retailers and the wholesalers continued throughout the late 1800s and into the 1900s. By the early 1900s it was clear that the star of the food multiples was rising and of the independent retailer falling - a trend that has continued to the present day. The independent retailer and the wholesaler were not the only organisations to be squeezed by the food multiples. Food manufacturers found that the wholesalers tried to maintain their margins by demanding lower prices. Their answer was to eliminate the wholesalers and move to direct delivery in towns and cities where it was economic to do so (McKinnon, 1981). Peak Frean were regularly delivering biscuits to 40,000 retail outlets in 1922 (Corley, 1972), Cadbury Brothers were delivering confectionery to 100,000 outlets by 1938 (Cadbury Bros., 1945). For a while this strategy improved the food manufacturers margins but it became increasingly inappropriate as distribution costs spiralled when petrol prices rose during after the Suez crisis. The power of the multiples was unstoppable and in the period 1938 to 1983 they came to dominate the distribution chain as illustrated in Figure 2.11.

McKinnon (1989) indicated that by 1989 the percentage of direct sales from food supplier to the food multiples had risen to 60% and this continues to rise. During the 1980s and 1990s food distribution channels have continued to evolve. There has been a continued drive to improve the efficiency of the distribution chain and to drive down costs. This has led to new configurations in warehouses and in control systems, to a reduction of 'own' warehouses and delivery fleets, and to an increase in control through new warehousing technology and computer systems.




(Sources: Jeffreys,1950; NEDO, 1985; OFT, 1985; and adapted from McKinnon, 1989, p 48)

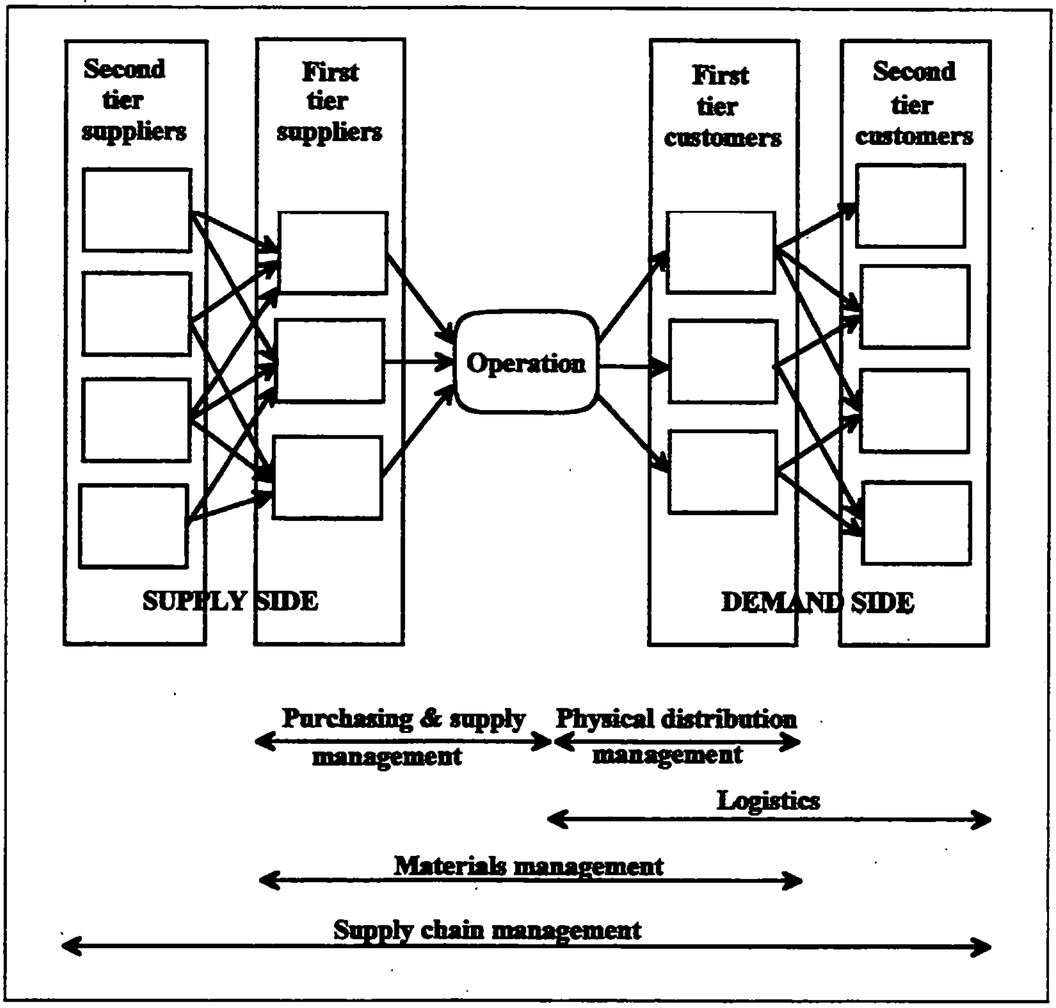
**Figure 2.11 Analysis of retail sales through marketing channels: 1938 and 1983**

The importance of the distribution chain and its impact on the economics of retailing has only been really appreciated in the past 50 years, and understood in the past 15 years. The key that has unlocked this understanding has been the availability of accurate data and the systems to use and interpret this data. For the food multiple retailer this improving control has allowed the reduction of inventory and the costs associated with it. At the current time the use of Just-in-Time purchasing systems have reduced overall inventory in the Tesco distribution chain from two months in the 1950 to 14 days in 1995 (Tesco, Reports & Accounts, 1995). The control of these systems rests with the food multiples and through these systems the food multiples control the distribution chain.

### *2.5.2 Distribution nomenclature*

The purpose of a retail distribution system is to get produce from one geographical situation to another in a timely manner and at the minimum cost. A seemingly simple task until one considers that a modern multiple food retailer may have upwards of 25,000 individual product lines ranging from fresh fruit to baby clothes. A small proportion of this produce may be supplied by local organisations but the majority will have come through a distribution chain that may have begun on the other side of the world.

When examining distribution systems it is as well to be clear about the nomenclature used to describe them. Figure 2.12 illustrates the various links that may be found in a supply and distribution system. Purchase and supply management relates to an organisations interface with its suppliers. Physical distribution management is usually applied to the relationship between an organisation and its immediate customers. Logistics, a word commonly misused, applies to the whole of the distribution chain from the organisation to its customers. Materials management is the phrase used to describe the chain between first tier suppliers and first tier customers. Finally, supply chain management is the phrase used to describe the complete distribution chain.




(Source: Adapted from Slack et al, 1995, p 512)

**Figure 2.12 Supply chain terminology**

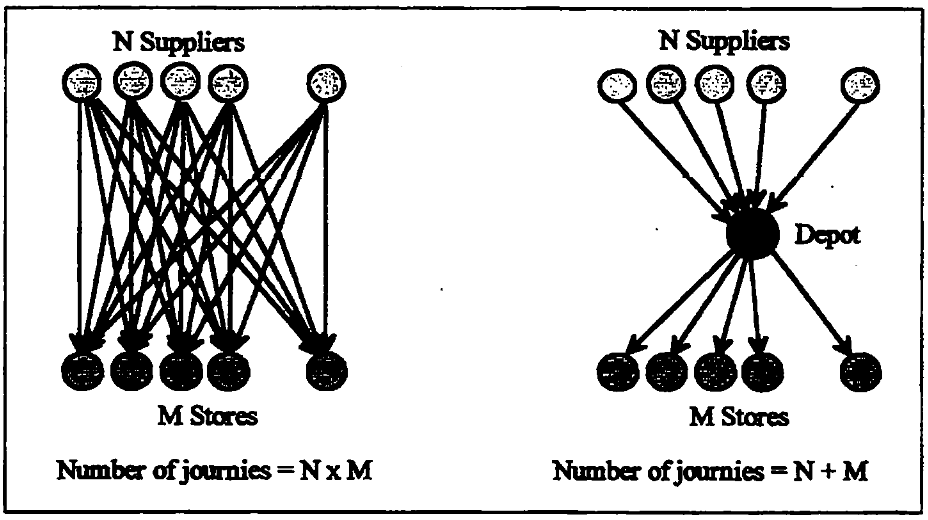
### *2.5.3 The development of modern food multiple distribution systems*

Food retailers have always understood the importance of efficient and effective distribution systems in terms of its impact on cost and food freshness. Indeed the evolution of retailers such as J. Sainsbury was closely tied up to the evolution of their distribution systems. However, distribution activities have not always been accorded such importance. Some early writers on management (Drucker, 1962; Warman, 1971; Alexander, 1969) regarded distribution as of second order importance - something to be mentioned in passing but hardly worthy of serious consideration in the debate on management strategy. To some extent this point of view was understandable as much of the early research undertaken on distribution systems was in the fields of operations research and mathematics. The early techniques of distribution analysis, such as linear programming and transportation modelling, were often inaccessible to many managers who had non-numerate backgrounds - and this was the rule rather than the exception in the late 1950s and early 1960s. Precisely what changed these management attitudes to those of today, where the distribution chain is regarded as being extremely important, is difficult to say. McKinnon (1989, p.2) describes this change in attitude as "the revolution in physical distribution", but this is probably overstating the situation. However, at this time researchers such as Stewart (1965) and Kotler (1967) were developing new ideas about the nature of enterprise. They suggested that for an enterprise to be effective in the market place the manufacturing *and* distribution systems had to optimised. The problem that organisations faced was that they simply had not been systematically gathering data about their distribution systems. There were of course a few notable exceptions. Stacey and Wilson (1958) described how Unilever in 1955 had identified that a single days delay in their distribution cycle would cost them £5m in additional working capital; and that 13 man days were required to produce a ton of washing powder but 19 man days were required to distribute it. But in the early 1960s the majority of organisations would not be able to undertake an analysis of this kind. When the idea of the integrated enterprise did eventually gain common management acceptance it was against a background of increased economic activity, growing and diversifying markets, and of money being available for the kind of investment needed in the distribution infrastructure (Hill, 1966).

From the beginning of the 1960s the food multiples entered a period of constant change. The early changes were associated with the transition from the small store format to the supermarket format and this was accompanied by a very rapid increase in the number of lines available within the store. For example in J. Sainsbury average store size grew from 3,300 sq. ft. in 1950 to 10,200 sq.ft. by the beginning of the 1970. During the same period the number of product lines rose from 550 to 4,000 .. In the following 15 years the changes were associated with the transition from supermarket to hypermarket. The average Sainsbury store increased in size to 30,000 sq. ft., and in lines on offer to 19,000 (Williams, 1995, p.219). This pattern of growth was echoed or exceeded in most of the other food multiples, and the distribution system - both retailer owned and sub-contract - had to respond to large increases in both volume and variety. In the early 1960s the distribution system, that had not been improved since the Second World War, was already under pressure. New, and larger, facilities were planned to cope with changes in demand patterns and volumes that few had predicted. Where to put these new facilities and how to service them stimulated much thought, although the problems were hardly new and had been contemplated in one form or another for the preceding two or three centuries (Cooper, 1963).

A survey of the published research during the 30 years that span 1960 to 1990 identifies several themes that have received varying degrees of attention. Some of these themes have been fairly general in nature (e.g. the nature of marketing channels), other themes such as cost minimisation in the distribution chain, stock control and international sourcing are of direct relevance to the efficiency of the food multiples. These issues are now given further consideration.

It has already been demonstrated in Figure 2.11 that between the mid 1800s and mid 1900s there was a steady decrease in the use of general wholesalers by the food multiples. This was accompanied by a steady increase in the use of direct delivery from manufacturers by the food multiples. In part this is explained by the increasing buying power of the food multiples due to size and market concentration, and in part by the need to tightly control a distribution system that was adjusting to rapidly increasing variety and volumes of products. As food producers margins began to be squeezed by the multiples they realised that deliveries from factories to individual retail outlets were becoming increasingly uneconomic. The food producers response was to store produce at strategically placed depots and deliver from the depots on receipt of order. The economics of this arrangement are quite self evident and are illustrated in Figure 2.13.




(Source: Adapted from Artle & Berglund, 1959)

**Figure 2.13 Distribution systems with and without depot**

By adopting this simple strategy, and in effect replacing the role of the traditional wholesaler, substantial savings were made. In this illustration the number of journeys would drop from (N x M) to (N + M). Using the same model cost could be saved in other ways. By increasing the size of the delivery to depot fewer deliveries needed to be made from the factory. Examining this area of operations Williams (1975) demonstrated that the relationship between delivery cost and the size of a consignment follows a negative exponential curve. The corollary of this finding was for food producers to reduce small deliveries to retailer or wholesaler depots, or alternatively introduce a 'small delivery' surcharge (Walters, 1976; Lambert et al, 1983). An alternative approach to overcoming the diseconomies of distributing small quantities was to aggregate orders for groups of geographically close depots in orders to fully load a vehicle. These orders could then be collected from the depot by the individual customers. The scale of the problem faced by the producers in the food chain in 1979 is illustrated in Table 2.6.

| Organisation | Approximate number of shops | Approximate number of warehouses | % of turnover direct from supplier |
|---|---|---|---|
| Multiples | 7,000 | 100 | 27 |
| Co-operative Wholesale and Retail Societies | 6,000 | 150 | 8 |
| Wholesalers (Delivered Trade) | 21,000 | 240 | 3 |
| Cash and Carry Wholesalers | 52,000 | 590 | 3 |

(Sources: Mintel, 1979; IGD, 1980; Economist Intelligence Unit, 1980; McKinnon, 1989, p62)

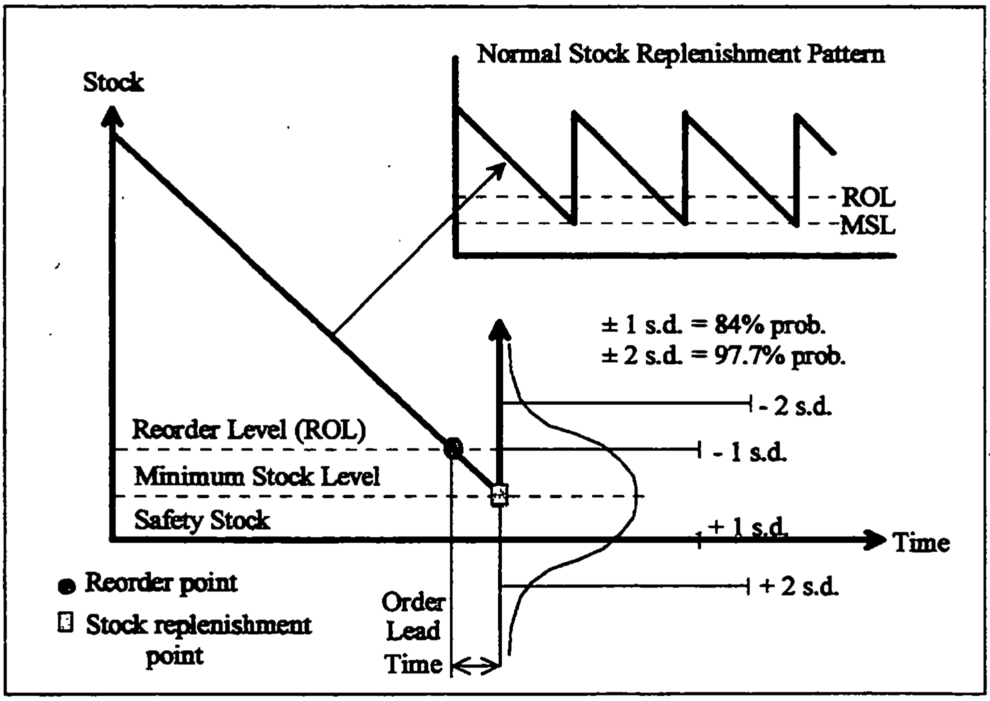
**Table 2.6 Number of grocery shops and warehouses, together with the proportion of trade handled, 1979**

The principle of aggregation, or more accurately re-aggregation, as a means of cost reduction had been in use by the food multiples for as long as they have operated the depot system. By accepting bulk deliveries, food multiples negotiated for higher discounts - usually 1 to 2% of the selling price of produce. The cost of disaggregation of bulk into individual store orders and re-aggregation for subsequent delivery costs the food multiples about 3 to 4% of their turnover (Thorpe and Shepherd, 1977). Clearly the reasons for pursuing this strategy must generate other financial benefits. With labour cost approximately 50% of the costs of a store (Dawson, 1982) time wasted handling and stacking produce needs to be carefully controlled. Kirby (1975) compared the unpacking time associated with two delivery situations. The first situation involved one delivery of 500 packs. The second situation had five deliveries of 100 packs. He found that it was 31% quicker to assemble and 47% quicker to disassemble the single delivery. McKinnon (1989, p.67) cites a similar study that found in the case of one London supermarket a large consolidated load from a central warehouse took 45 minutes to off load, the remaining 132 deliveries from direct suppliers to the supermarket took 25 hours to unload. Clearly aggregation at depot level would not only reduce handling costs at the store, but it would also permit more accurate control of the overall stock level. These kind of examples must be regarded with some caution as the 'greater' or 'consolidated load' arguments have to be considered in relation to stockholding costs. There is little point in increasing delivery sizes if stock deterioration or stock holding costs erode the benefits gained by pursuing the policy. Of course there are other less easily quantified benefits such as reducing the time management need to use in the supervision of unpacking activities. Clearly this will free management for other control activities, but it will only have value if that is actually what they do.

Controlling stock levels accurately, and efficient ordering systems, are two other ways of controlling costs in the multiple retail distribution chain. As has already been identified, unused or slow moving stock is undesirable in a business that typically has low gross margins and food products have low margins that are typically between 3% and 7%. This means that produce must be turned over quickly and that stock must be minimised, two clearly related phenomena. In the 1850s food distribution systems were still evolving. Waugh's (1951) account of the operations of Lipton during the 1800s suggests that shortages or stock outs were common and often due to food being spoiled in transit or to unreliable transport. Both Lipton and Sainsbury addressed this problem directly by having their own transport (Williams, 1995). Within the shops fresh food could only be stored for limited periods of time. So, in one way at least, stock-outs often meant that food on the shelves was relatively fresh. Sainsbury in particular went to great lengths to keep food fresh. He bought ice and used it to cool his warehouse, his lorries (forerunners of today's refrigerated vehicles) and in his shops to keep dairy produce cool. These kinds of products were usually delivered regularly.

Waugh and Williams suggest that the most commonly used system of stock control in the Victorian period was the two bin system. As produce was emptied from the shelf, a box or pack was opened and the shelf restocked. A replacement box or pack was then ordered. This left the storekeeper with one package waiting to be used and one package on order. Providing the delivery occurred before both active and reserve stock was used there were no problems. This was a simple system to administer at the store level but subject to problems when there were sudden increases in demand, or alternatively when over cautious store managers ordered before the stock on the shelf was used. The other problem with the two bin system was that a bin may hold slow moving that could take several months to use and consequently increase the stock holding costs.

As distribution systems became more reliable it became possible to consider alternatives to the two bin system. In the early 1900s continuous review systems began to be used. In these systems usage of stock was monitored and the data gathered from this exercise used to predict when to order the next consignment of a product. Figure 2.14 illustrates the operation of such a system. The graph indicates the predicted stock usage based on historical data. Before the stock falls to the minimum stock level (safety stock) an order must be placed in time for the goods to be delivered. The delivery time, known as the order lead time, is usually determined by monitoring supplier historical delivery performance. The reorder point must be set to reflect an acceptable risk level to avoid stock-out situations. It is never possible to entirely eliminate this risk without incurring a heavy economic penalty. In practice the risk of stock-out (due to demand or supply problems) is likely to follow a normal distribution curve.




(Source: Adapted from Buxton, 1975)

**Figure 2.14 Stock usage and reordering pattern with stock-out risk approximating to a normal distribution.**

Buxton (1975) argued that by setting the reorder level to one standard deviation, the risk of running out equated to the area under the normal curve above + 1 standard deviation (i.e. 8% (i.e. 100 - [50 + 42])). Should the reorder level be set to 2 standard deviations the risk of stock-out is reduced to 1.15% (i.e. 100 - [50 + 48.85]). The problem with increasing safety stock is that the stock holding cost also increases and it has been shown that in practice reducing stock-out risk below 2% is rarely cost effective (Ray and Millman, 1979). If this level of 2% were translated into an order for 10 different lines there would only be a probability of 0.8171 (i.e. $[1 - 0.02]^{10}$) of getting a full order. (If ± 2 s.d. were used the probability rises 0.8908.) Using this argument Christopher et al (1979) demonstrated that in a substantial order it is unlikely that the full order will delivered. This approach to ordering has also been criticised because of many of the assumptions that are made - that demand is known and predictable, that a product will always be available for delivery, that deliveries will not be split by the supplier and that the method of delivery is reliable. In the real world few of these assumptions are true. However, in spite of this and of the possibility of shortages, this systems does reduce stock holding costs and as such is better than the two bin system.

The continuous review system has been criticised for failing to take all costs into account. A more balanced view needs to consider financial costs, storage costs, and ordering costs (McClelland, 1960). Financial costs will include interest payable on working capital, depreciation and in some countries tax on the average stock value (Ballou, 1978). Storage costs will include the cost of maintaining and servicing the storage system, shrinkage and spoilage, and stock obsolescence (e.g. changing tastes, food scares, out of date produce). Ordering costs are the costs of placing an order and will include stock monitoring costs, order aggregation costs, order preparation costs, printing, postage, etc. Dobler and Burt (1996) demonstrated that the point at which the carrying costs (i.e. financial costs and storage costs) are equal in value to the ordering costs is the point at which the most economical ordering quantity (per product) is defined. This is shown:

Carrying costs = average inventory in units x unit cost x inventory carrying cost as a % of inventory value

$$= [Q/2] \times C \times I$$

(n.b. Q for the order and delivery are assumed to be the same)

Order costs = number of orders placed per year x cost of order

$$= [U/Q] \times A$$

Economic order quantity occurs when the annual carrying cost equals the ordering costs -

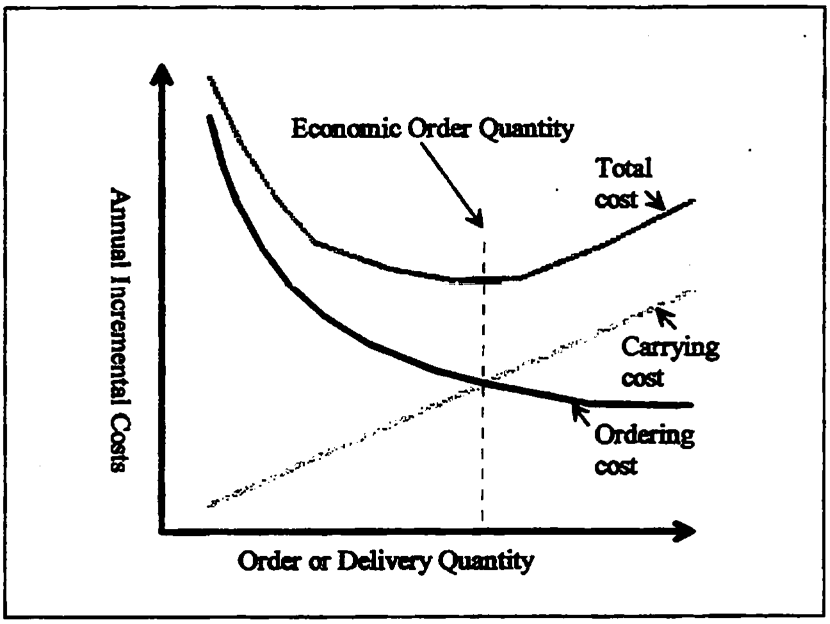
i.e. $[Q \times C \times I] / 2 = [UA] / Q$

Solving for Q

$$Q = [\{2 \times U \times A\} / \{C \times I\}]^{\wedge}0.5$$

This relationship is graphically illustrated in Figure 2.15. The Total Cost curve is the summation of the Carrying Cost and Ordering Cost curves. The Economic Order Quantity occurs at the nadir of the Total Cost Curve and is shown by the dotted line.

Both of these systems have been used at store level where demand patterns may be quite unpredictable for some items. At the depot level, where many stores demand is aggregated, two effects can be observed. The first is that demand across many stores may be quite stable in spite of the fact that individual stores may be experiencing quite a




(Source: Dobler and Birt, 1996, p 528)

**Figure 2.15 The relationship between ordering cost, carrying cost, total cost and economic order quantity**

variation in demand (Schary, 1984). The second is that when global demand increases at the store level consistently, then there is an amplifying effect on demand throughout the supply chain. Forrester (1961) demonstrated that a 10% increase in demand at store level could give rise to an increase in 16% of orders from the depot (or warehouse) level. In turn this generated a 28% increase in orders from the depot level and a subsequent 40% increase in production. Forrester attributed much of this amplification factor to the natural gearing of the system, arguing that it would be worst in channels where communications were poorest and order lead time longest.

Where demand for a range of produce is relatively stable, communications channels effective, and order lead time short then it possible to consider using a technique called Distribution Requirements Planning (DRP). A DRP system takes usage and stock availability information from all parts of the distribution chain, co-ordinates it with lead time information associated with movements between different parts of the distribution chain and the demand forecast, to control order sequencing, volumes and stock movement throughout the whole of the distribution chain. In doing this the DRP system prevents over-ordering and minimises stock holding throughout the system. The operation of a DRP system is illustrated in Figure 2.16. The basic parameters that have to be defined in the system for each product is the minimum order, the level of safety stock and the order lead time. In more sophisticated systems the order level may be defined in volume / price break terms. On the basis of past demand patterns, and with reference to current merchandising activities, a demand forecast will be made for the product. The length of time covered by the forecast varies according to the product. It may be possible to forecast the demand for a staple product, baked beans for example, for several months ahead. For other products that have a seasonal demand pattern, nuts for example it may only be possible to forecast for a few weeks. The DRP system is initialised with the stock position at the beginning of the period and the actual demand (orders received for 150 units) for the first week. If a delivery is due during the first period, this is also registered by the system, although this will not be allocated into active stock until the beginning of the following week. It can be seen that end of the first week, all orders having been satisfied, leaves a week end stock of 50 units. This stock, plus the delivery stock will be carried forward to the following week. Looking ahead from week 1, if the forecast is met then a shortfall will occur in week 4. To avoid the shortfall stock must be ordered in week 1 for delivery in week 3, to be allocated in week 4. At the start of week 1 only 50 units have been ordered for week two. During the first week further orders may be received that may reach or exceed the forecast, alternatively the forecast may be optimistic. The DRP system assumes at initialisation that the forecast will be met, but will adjust the ordering frequency to reflect reality. In the example in Figure

2.16, if the orders for week 2 did not reach the forecast level the DRP system may delay the order placement in week 3. If the orders exceeded forecast it may bring the order planned for week 3 forward to week 2. If demand was consistently higher than forecasts then the DRP system would increase the order quantity in whatever multiples the producer delivers.

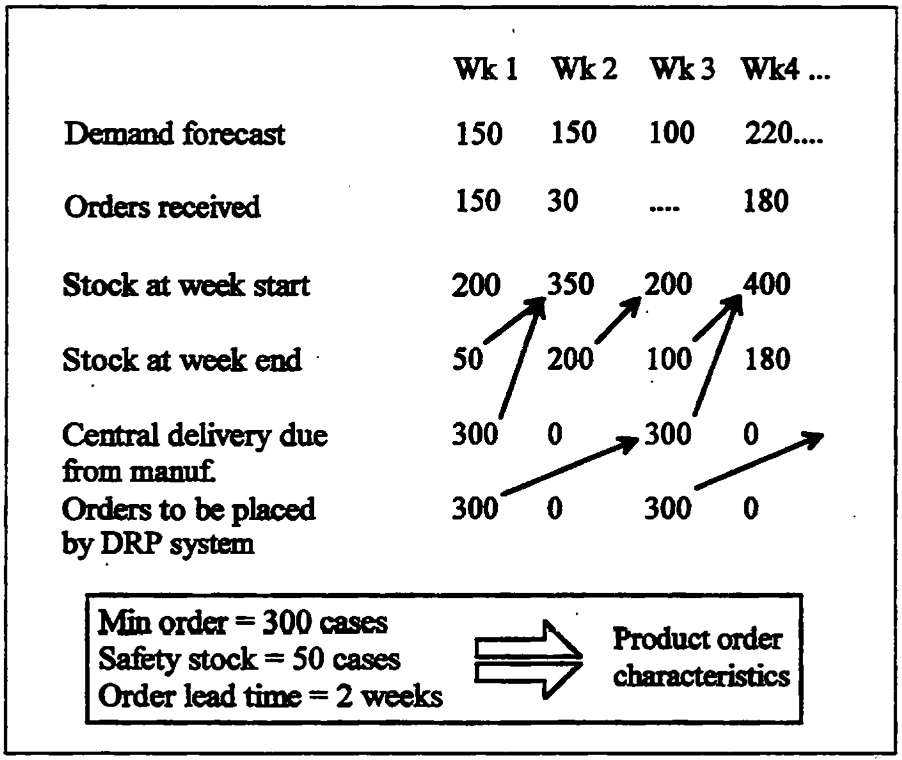
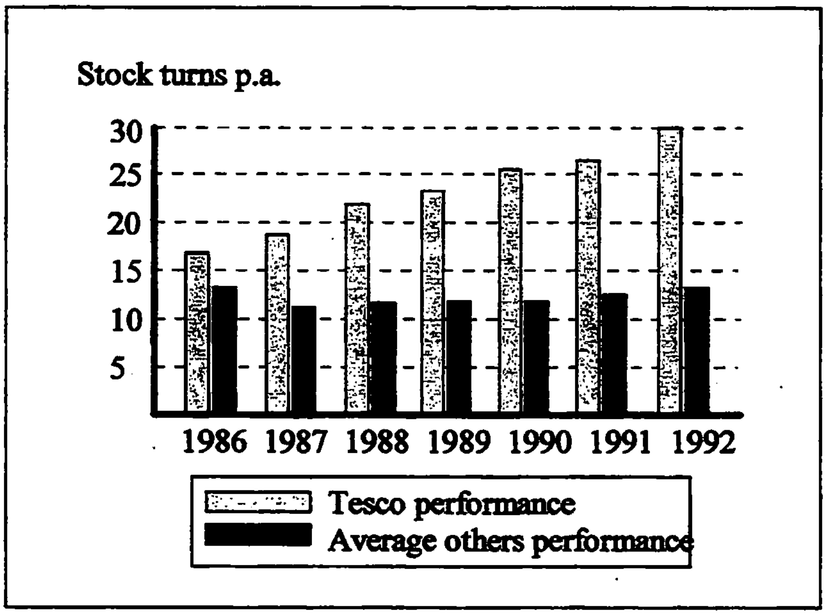



**Figure 2.16 Stock movements in a DRP system**

In a typical modern multiple retailer there are thousands of product lines that would require an army of people to progress in a manual system. DRP makes control of this number of items possible and DRP systems are always run on computers, usually a central function of the retailer's organisation (Orlicky, 1975). The data required to inform the system about stock movements is usually gathered by reading bar coding either on the case or on the product within the distribution cycle. DRP is better than any of the systems previously discussed when applied at depot level, and when it was introduced in the late 1970s to the distribution chain it had a significant impact on stock holding. The main difficulty with the system in the early days was the lag time between the DRP system registering the need for an order and the order actually being despatched to the producer. This was because manual systems were still in use for actually placing orders. It took the evolution of Electronic Data Interchange (EDI) for DRP to reach its full potential. With EDI the retailer head office computer actually placed the order with the supplier without the need for manual intervention. (This process will be discussed in detail in Chapter 4.) Unfortunately in the early 1980s the multiple retailers were very slow to adopt this technology and it was not until the mid 1980s that the DRP systems really delivered the full benefit to its users (Bamfield, 1993).




(Source : IGD Research Services, 1993)

**Figure 2.17 A comparison of Tesco stock turn to average others performance 1986 to 1992**

Figure 2.17 illustrates the impact that DRP and related systems enhancements have had on the stock turn of Tesco in recent years.

If inaccurate data is put in to the DRP system it has the potential to cause many problems. To avoid data inaccuracy regular audits of stock throughout the distribution system are required. These are costly and can negate some of the savings that the system makes. The other problem with DRP is that it operates at the depot (or warehouse) level in the distribution chain. It took the application of another technology, Electronic Point of Sale (EPoS), to extend the principle of automated ordering down to the store level (Fernie, 1994). Like DRP, EPoS as a concept was developed in the mid 1970s. The EPoS technology allowed individual item bar codes to be scanned at the point of sale, and from this information item cost could be determined for billing purposes. Using the same information aggregated store usage levels could be also be determined. Even when bar coding had been standardised it was some time before it was extended from the case to individual items within the case. The effect of EPoS on the food multiples operations was extensive. Initially EPoS was only used in store as a way of ensuring the correct price for products was charged and a small percentage of produce was scanned. Eventually this percentage grew to embrace nearly all of the produce sold. In 1983 Sainsbury only scanned 1% of their products, by 1989 this had risen to 90% (Wrigley, 1993). By the mid 1980s most of the multiple retailer's store computer systems had effective bi-directional communications links with head office computers. Software systems were built that linked the data that was gathered as the result of EPoS scanning to the ordering system. This was the link that was required to close the distribution control loop and for the first time the possibility of 'Just in Time' (JIT) ordering became a practical possibility.

The pattern of evolution of stock control systems is defined by the ability to count stock accurately, to locate stock and trace its movements accurately, and to get information from the point of sale to the ordering mechanism. The better these functions work, the less stock is required. However, the inbuilt assumptions of the stock control systems examined so far is that there will be stock in the system and that it will be static for periods of time within the lead time cycle. Clearly if it were possible to keep stock moving then storage savings could be made and depots could be reduced in size, or removed all together. Alternatively the same depots would be able to cope with a much larger volume of produce. The principle of keeping stock moving and synchronised to the actual demand patterns at the store level is the essence of JIT, and the multiple retailers had examples of JIT systems working in manufacturing to consider.

In manufacturing, JIT operates on the principle of 'demand pull' rather than 'inventory push'. In other words a component or assembly is only ordered when, and in the numbers it is required. When it is delivered it will be used or assembled within a short time, and it is often delivered directly to the point of use rather than into a storage system. In theory JIT can be efficient down to an order level of one, but in practice because of the costs associated with transport, order levels usually reflect the demand for a shift or working day. Where the supplier is geographically close and connected by an EDI system it may be possible to reduce order levels and have several smaller orders delivered within each shift or working day (Logothetis, 1992). In Japan, where JIT systems were first used by car and electronic manufacturers, many suppliers have their factories or workshops adjacent to the main factory. This made multiple deliveries within the working day a practical possibility. In other parts of the world this situation is unusual and deliveries are usually made against a master schedule, usually having a two or three weeks time span, that will be updated on a weekly or daily basis (Schonberger, 1982). The other issue that is central to the efficient working of JIT systems in manufacturing is that of quality. Clearly if no, or little, stock is kept in the system then each component or assembly must be 100% correct on delivery otherwise the manufacturing system will eventually stop because of shortages. Thus the quality system in supply chain processes must be capable of achieving this high quality standard consistently and reliably. The need to achieve this standard has led to the development of the Total Quality Management (TQM) concept in which a wide range of quality techniques and methods have been developed that may be applied to all parts of the supply chain. The other issue that JIT system implementers had to face was that of supplier relationships. For JIT to work the interface between the supplier and the buyer had to change. The traditional 'arms length', adversarial relationships in which suppliers were 'played off' against one another for price reductions was no longer appropriate. This was replaced by closer relationships between the buyer and supplier in which may be almost symbiotic. This meant three things. Firstly, the number of suppliers were radically reduced - sometimes to single sourcing for individual components or assemblies. Secondly, the focus shifts from price to cost, where cost is a composite 'whole life' calculation (e.g. rework, shortages, scrap and stock holding costs as well as the actual price of the product). Finally the supplier becomes involved within the design process of the product in order to pool knowledge and expertise with the general idea of producing a better product in the first place.

With the example of the benefits that manufacturing industries have achieved in terms of cost and space reductions and quality improvements, it is not surprising that the food multiples were interested in implementing JIT in their supply chain. Other reasons that must not be ignored are that of market positioning and freshness policies. The food multiples in the UK have a higher overhead profile than equivalent organisations in

Europe or the US, primarily due to the higher cost of land. Thus to maintain or improve margins to cover these higher costs requires competitive strategies not to be based on price competition but on quality, variety, service, store image and efficiency in the supply chain. The net effect of these factors is to force the food multiple up market away from the sector where competition is based on pricing (Weinstein, 1991). In these upper market sectors the issues of quality and freshness, particularly for green grocery is very important. JIT supply is the key to fresh produce availability and a consistent quality product range (e.g. being able to buy top quality salad products all year). Again, in terms of margin maintenance, green grocery margins are significantly higher than those of canned food (most green grocery products have a 35 - 45% profit margin, canned produce has a 5 to 7% profit margin), and green grocery can be responsible for up to 10% of a stores sales and about a third of its gross profit (Brookes, 1995). Clearly a JIT supply driven by actual sales is highly desirable.

The JIT principle has been adopted by the food multiples under the title Quick Response (QR). In retailing it was not the food multiples who were the first to explore QR - it was the fashion business in the US (General Electric, 1992 and 1993) who claimed spectacular reductions in inventory, customer service improvements and profitability (Walker, 1994; Fox, 1991; Gill, 1991). When the food multiple retailers moved to adopting QR Whiteoak (1994) states the objectives were:

a. to eliminate unnecessary stock, double and triple handling and inefficiency in the supply chain,

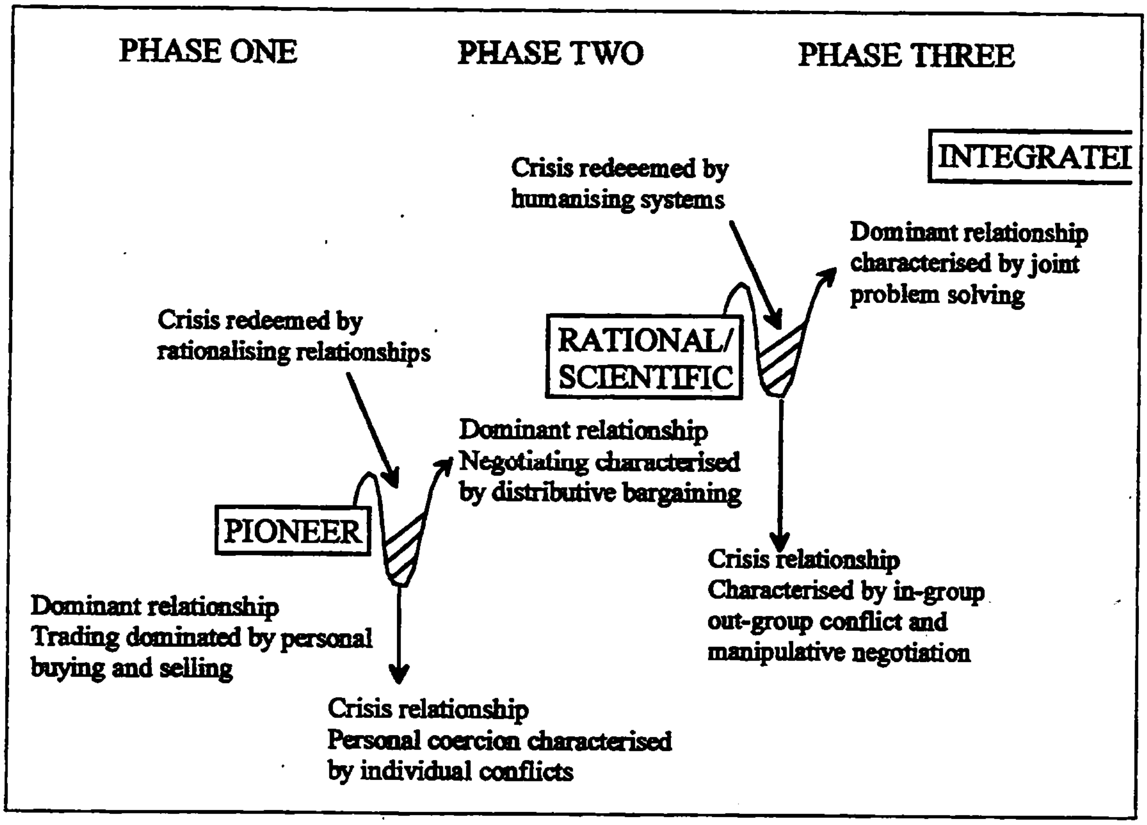
b. to eliminate unnecessary tasks through simplification and automation,

c. to improve supplier - buyer relationships and reduce the number of suppliers with all parties gaining benefits from economies of scale.

What worked against the general desire to maximise product availability and minimise costs and administrative effort were principally history and inertia. The suppliers were deeply suspicious when the food multiples began to discuss moving to QR. Whiteoak (1994, p.33) summarises a typical supplier's response:

> "... It is easy to talk in general terms about the principles of partnership. ... Despite increasing willingness to work together there remain many attitudes, prejudices, corporate cultures to be changed and hidden agendas to be exposed if the full range of possibilities are to be explored."

Clearly suppliers do not believe that the adversarial buying culture in the food multiples will change quickly and that buyers in the food multiples have much to unlearn. From a buying point of view the transition to a QR culture presents many challenges. With perhaps 20,000 to 25,000 items on the merchandise catalogue the transition to QR is bound to take a considerable time. The way in which the processes of negotiation have to change are described by Dawson and Shaw (1990) in Figure 2.18. It will be seen that the transitions are far from simple and at each stage of the transition from adversarial relationship to integrated relationship crises can, and do, occur. The important conclusion that may be drawn from this transition process is not linear and will almost certainly take a considerable period of time. Evidence that support this change model has been found by Mallen, 1963; Frazior and Sheth, 1985; Jeuland and Shugan, 1983; Narus and Anderson, 1987; and, Reve and Stern, 1979. Where negotiations have been successful, as was the case with Tesco, Fernie (1994) found that Tesco had managed to reduced their supplier base from 2,500 to 1,300 between 1990 and 1992.




(Source: Dawson & Shaw, 1990, p 22)

**Figure 2.18 Phases in the changing nature of retailer - manufacturer relationships**

QR is still an active issue in the food multiples. Most have a substantial proportion - between 60% and 80% - of their product line purchasing controlled by QR systems (IGD, 1993). Extending QR control to the whole product range is hampered by the development of the food producers - in particular those who are at the end of geographically long distribution chains, or those who deliver from countries where the technological infrastructure is not well developed. The problems associated with geographically remote suppliers are not new. The early histories of J. Sainsbury

(Appendix 2), Lipton (Waugh, 1951), and other Victorian multiples (Barty-King, 1986) are littered with the difficulties of getting and maintaining supplies from abroad. During the late 1800s much of the meat imported was salted and packed in barrels, and in this state could withstand extended voyages and supply lead times. Other products, in particular fresh soft fruits and vegetables could not be sensibly sourced from abroad. Where they were imported they were usually dried before despatch, for example currants, raisins and dried apricots, and bulk packed. Even products such as tea presented many problems because of the transit time from India and China and the propensity of cargo to get wet in many of the old sailing ships. Gradually wooden sailing ships were replaced by steel ships and the problems of spoilage (sometimes as high as 30% to 40%) receded. Even so, the delivery lead time for fresh fruit was still too long and it required the development of refrigeration to make importing it a practical proposition. By the early 1900s refrigerated ships were available and produce such as bananas changed from being a rarity to becoming a readily available commodity. Other products such as apples from the southern hemisphere became available when UK supplies were not in season. Refrigerated ships also made importing cheap frozen meat from Australia and New Zealand a practical possibility.

Sourcing strategies during the late 1800s and early and mid 1900s, excluding wars, tended to follow the season variations of the country in which the produce was grown. During the early 1980s eating habits began to change and the demand for fresh fruit and vegetables, especially salad produce, was year round. To meet this demand the multiples began to develop proactive sourcing strategies that were truly international. Improved transportation, especially air transport, meant that produce picked on one day in the southern hemisphere could be on the housewife's table in the UK two days later. This led the food multiples to establish new sources of supply for fresh fruit and vegetables in countries where particular products had not been traditionally grown, and in volumes higher than that needed to supply the local markets. Safeway, for example, source a high proportion of their salad produce from Spain during the winter months. Conversely, the market that the food multiples offer has encouraged remote countries to develop products designed to appeal to the European consumers palate. An example of this phenomenon would be wine being grown in countries such as Australia, New Zealand and South America. In line with this process of globalisation there has been an improvement in the distribution chain with specialised transport such as the refrigerated lorry, and in the quality of packaging. These improvements keep produce fresh and reduce wastage due to mishandling throughout the distribution chain.

The issues associated with distribution systems are complex. Much energy in the food chain is expended on getting the right food to the right place at the right time. When changes to the distribution chain have been made they have been done well and usually on a large scale. The drive for food multiples to improve their distribution system has been prompted by their constant search for better customer service and increased efficiency. Through improving systems and resource utilisation they have kept the system that delivers thousands of stock items under control - a nontrivial task. As a leading edge user of the distribution system the food multiple have been quick to exploit innovation and through their buying power encouraged others to innovate. They have not been innovators themselves.

## *2.6 General conclusions*

Having reviewed the literature associated with strategy, technology and organisations, performance measurement and finally distribution systems, three issues become clear.

Firstly it seems clear that the complexity of an organsation arises not so much from the task the organisation sets itself in market terms, but on how it organises itself for this task. Success in a market place similarly depends on maintaining a balance between an understanding of a customer's changing needs and on developing and maintaining an organisation's general and unique competitive resources to satisfy those needs.

Secondly the literature review has shown that little research has been focused on the relationship between technology and strategy in food retailers. In undertaking the research for this thesis the author will therefore be making an original contribution to knowledge.

Thirdly it is clear that information systems play an essential role in the way in which the multiple food retailer responds to its customers needs, measures its performance, and controls its operations. It is a core competence. In examining the relationship between the multiple food retailers and the information technology they use this literature review highlights the following targets for the methodology:

i. to gather information that will enable the analysis of the histories of the food multiples in order to understand the mechanisms, phases and drivers of change;

ii. to gather information that will enable the analysis of the retailer information systems in order to understand the way in which they are used in operational and strategic terms; and,

iii. to gather information that will enable the analysis of the way in which information technology, operational and strategic activities interact

By gathering this information and analysing it this research will be able to determine whether or not technology is enabling or leading strategy in the food multiples.

# Chapter 3
## Methodology

### 3.1 The approach to the investigation

During the research a mixture of qualitative and quantitative techniques were used. The quantitative techniques were used to obtain comparative data where it was available and relevant to the research (i.e. the design and structure of the technology systems, financial and operational information). Qualitative techniques were used to establish a picture of events in the retailers during the period 1980 to 1990 and subsequently. The choice of a qualitative approach for this aspect of the investigation was prompted by the following -

a. the situations being investigated were complex involving organisations that employ a large number of people, operate on a wide geographical basis and that use a wide variety of technology;

b. the number of data sources, especially executives with the appropriate knowledge of the organisations, was very limited;

c. a purely quantitative approach could have missed information vital for *understanding* the events in the organisations.

Adopting this approach was following a well established tradition of organisational investigation identified by Bryman (1992). The qualitative approach is widely used in the social sciences and has been described by many authors (e.g. Patton: 1990, Bogden & Bicklen: 1992, Denzin: 1978). Its value is that it allows complex issues to be addressed and personal opinion or interpretations to be given about a situation. The choice of data collection within this framework of enquiry is wide. Marshall and Rossman (1995) identify eight primary methods of data collection.

***Participation*** - actively taking part in the situation being investigated and through this participation building an understanding of people and issues of importance. (Pelto & Pelto: 1978, Spradley: 1980, Jorgensen: 1989, Van Manen: 1990)

***Observation*** - the systematic recording of events, artefacts and situations in the social setting being observed. (Evertson & Green: 1985)

***In-depth interviewing*** - in which a formal or semi- formal structure is used to elicit information about an organisation or situation. (McCracken: 1988, Patton: 1990, Tripp: 1983)

***Ethnographic interviewing*** - based on the disciplines of cognitive anthropology and used to gather cultural data. (Spradley: 1979, Filstead: 1970, Wolcott: 1985)

***Phenomenological interviewing*** - designed to explore and understand the view that a range of individuals have of their 'world' and which is open ended in nature. (Patton: 1990, Bogdan & Bicklen: 1992, Taylor & Bogdan: 1984)

***Elite (or expert) interviewing*** - closely related to phenomenological interviewing except that the interviews are restricted to those who have a senior position in their organisation and who have access to a wider range of information that those lower in organisations. (Becker & Meyers: 1974, Marshall: 1984, Platt: 1981)

***Focus group interviewing*** - often used in the marketing environment to determine the attitudes and opinions of a like group of people, the review of documents - usually used as a way of supplementing and confirming information gathered from the previously described methods. (Birn, Hague & Vangelder: 1990, Krueger: 1988, Morgan: 1988)

Supplementary data associated with these primary methods can be attained via a wide range of devices - narrative analysis, life history analysis, environmental history analysis, films videos and photographs, kinesics and proxemics, questionnaires and surveys, projective techniques and surveys, and repertory grid techniques. The choice of which of these is used will depend to a greater extent upon the situation and the people involved.

Marshall and Rossman indicate that to some extent these primary and supplementary methods of gathering qualitative information all suffer from similar problems. They all have a danger of participant bias and influence; it is difficult to draw general conclusions from the results of these types of investigation; metrics are difficult to construct and administer; they are expensive in terms of time; data recording can be difficult or inaccurate; and, data may only have meaning in a specific environmental context. However, providing these limitations are borne in mind the qualitative approach offers a wider and richer source of information than the quantitative approach.

The qualitative techniques used in this research were -

a. semi-structured expert interviews in the retail organisations to capitalise on the detailed knowledge that interviewees had about the development of their organisations, strategies and systems,

b. semi-structured interviews with the technology systems suppliers to determine the philosophy and structure behind the design of the systems for the food retailers, and

c. structured interviews with suppliers of systems components (e.g. Bar Code Readers, Bar Code Printers, EPoS Terminals and Cash Registers) to determine how these system components have been, and are being developed and applied in the food multiple information technology environment.

The data gathered by these techniques is summarised in the following three chapters

### *3.2 The choice of organisations studied*

This research is focused on three multiple food retailers - J. Sainsbury, Tesco and the Safeway (Argyll Group). There were five reasons for choosing these organisations:

1. They are trading in the same segment of the food retail market (upper quartile).
2. They sell their produce to similar socio-economic groups (Table 3.1).
3. They have all been influenced by the same general economic changes at the same time; and this simplifies the comparative process by eliminating a major variable in the analysis.
4. They all invested heavily in technology during the period 1980 to 1990, and have continued to do so since this period.
5. They are among the most successful of the food retailing multiples in the UK.

Table 3.1 is a comparative analysis of key indicators associated with these three organisations. It gives an indication of the similarities and differences to be found in the 1996/97 trading year.

In addition to J. Sainsbury, Tesco and the Safeway as users of retail systems technology, three major UK based multiple retail systems suppliers were selected - IBM, ICL and

Siemens Nixdorf. These systems suppliers were chosen because they were responsible for supplying and maintaining the systems in the three food retailers being studied. By questionning these system suppliers it was possible to gain an understanding of many technical features of the systems, and to determine some of the technical and commercial constraints that influence retail systems design.

| | J. Sainsbury plc | Tesco plc | Argyll Group plc |
|---|---|---|---|
| Turnover £m [1] (Consolidated figs.)* | 13,395 | 13,387 | 6,589 |
| Pre-Tax Profit £m[1] | 695 | 774 | 462 |
| No. of Stores[2] (Including subsid's) | 384 | 566 | 487 |
| Average sales area sq. ft.[1] | 29,301 | 24,531 | 19,536 |
| No. of employees[1] (Full Time Equivalent) | 55,564 | 71,467 | 47,950 |
| No. of product lines[1] | 19,000 | 38,969 | 20,000 |
| No. of own lines[1] | 9,500 | 13,753 | 6,000 |
| Customer socio-economic group[3] | A, B, C1 (60%) | C1, C2 (54%) | A, B, C1 (56%) |
| Av. customer spend per week[1] | £22.93p | £23.04p | £17.12p |
| Customer age[3] | 56% 45 or over | 61% 35 or over | 25% 35-44 |
| No. of depots used for distribution[1] | 19 | 21 | 12 |
| Suppliers on EDI[1] | 95% | 95% | 95% |

Sources: 1 - Company Reports and Accounts, 2 - Company reports and Accounts, IGD, 3 - AGB Superpanel * Includes subsidiaries

**Table 3.1 Comparative organisation statistics for J. Sainsbury plc, Tesco plc and Argyll (Safeway) Group plc 1996/1997**

### *3.3 The Pilot Study*

A pilot study using the previously described quantative and qualitative was undertaken to establish a feasible research strategy and to confirm that the research would make an original contribution to knowledge about the food multiple retailer systems. The previously identified food retailers and systems suppliers were approached in writing with an outline description of the research to determine if they would be prepared to co-operate. All six organisations indicated they were prepared to co-operate subject to receiving more information. Subsequently meetings were arranged with all organisations. At these meetings the nature of the investigation was explained and undertakings to preserve confidentiality given - a condition that all required. These interviews were not recorded on tape but notes were kept throughout each interview and shortly after transcribed to reflect the full interview. A list of those interviewed during the pilot study is contained in Table 3.2.

| Organisation | Name | Position | Interview no. |
|---|---|---|---|
| J. Sainsbury plc | C. Montagnon | Information Systems Director | JS:CM1:09:93 |
| J. Sainsbury plc | C. Baker | Systems Development Manager | JS:CB1:10:93 |
| Tesco plc | R. Rumbellow | Information Systems Officer | TE:RR:10:93 |
| Safeway plc | M. Winch | Information Systems Director | SA:MW1:02:93 |
| ICL plc Retail Systems | P. Evans | Technical Manager Retail Systems | IC:PE1:03:93 |
| IBM plc Retail Solutions | P. Rees | Marketing Manager Retail Systems (Europe) | IB:PR1:05:93 |
| Siemens Nixdorf Ret. Syst. Divn. | I. Stewart | European Marketing Manager | SN:IS1:05:93 |

**Table 3.2 People interviewed during the pilot study**

N.B. Interview number is the transcribed note code - this identifies company: interviewee (1st, 2nd, etc. interview): month: year.

Because the interviews were a precursor to the main study, care was taken to avoid probing areas that the interviewees were uncomfortable with. A short questionnaire was used to ensure that the main areas of interest to the research were discussed:

a. Could you briefly explain how EPoS technology fit into your information and control systems?

b Do you have any diagrams or technical specifications that describe your information and control system in terms of how it works, and is this information available for inspection?

c. Who would be the best people (person) to talk to about your information and control systems?

d. How important is technology for your operational systems - and why?

e. Do you think that technology affects your strategy?

N.B. Questions (d) and (e) were not given to the systems suppliers in this format. They were phrased in terms of asking the systems suppliers to assess how these items affected their customers activities and strategies.

As will be seen in questions (a) the original intention of the research was to examine the implementation of EPoS systems in the organisations and to see how EPoS had affected retailing strategies. *The first outcome of the pilot study was to demonstrate that EPoS had so many complex relationships within the technology systems used by these retailers, that to treat it separately would distort the research.* It was only by investigating the technology system as a whole that meaningful relationships could be established between technology and strategy. *The second issue that arose was the similarity of the information and control systems that the three retailers used.* Because of this it was possible to derive a generic technology systems description that would have general validity in the multiple food retail sector as a whole. This seemed to be a worthwhile target for part of this investigation as no description existed at the time of starting the thesis in 1993. This was to prove an important backdrop when subsequently interpreting the strategies of the three retailers. *The final issue that arose was that none of the interviewees who work in the three food retailers, were prepared to talk in detail about current strategies and internal technical developments.* This was understandable in the context of commercial prudence and confidentiality. However, during this pilot research it became clear that the period 1980 to 1990 was important in the evolution of retail systems. This was a period of great technological change, and by focusing on this period it would be possible to gain useful insights into the development of past and present technology/strategy relationships. An additional benefit was that information about organisational activities during this period was not sensitive and was readily recalled by those interviewed. Other data that was required to complete the description the current management and control systems was available from the main system suppliers.

*In summary, the pilot programme demonstrated that the main research programme would make an original contribution to knowledge about the relationship between technology and food retailer strategies; and, was a practical possibility.*

The pilot programme helped to defined the structure of the full literature search and the structure of the enquiry into the nature of the technology systems used by Sainsbury, Tesco and Safeway. It also helped to refine the approach to the company histories that illustrate the changing relationship between technology and the general and operational strategies that the food multiples adopted as they evolved especially in the period 1980 and 1990.

### *3.4 The main research programme*

The main body of the research may be conveniently considered in four parts. The first was the literature review and this will be found in Chapter 2. The second part of the research gathered data about the information and control systems and about the system components. This data is correlated, and discussed in Appendix 1 and Chapter 4. The third part of the research gathered data to compile and summarise the histories of Sainsbury, Tesco and Safeway which may be found in Appendix 2. This information is correlated with the information gathered from the executives and senior managers of the organisations and was used to evaluate the evolvution of information technology and strategic issues. This information, together with that gathered in other aspects of the research was used in Chapter 5 in which the development of the food multiples is examined. The fourth part of the research programme is discussed in chapter 6 and this examines the relationships between performance measurement systems, core competence development and information systems development. This chapter draws on the data and conclusions from Chapters 4 and 5.

Wherever possible the interview data was triangulated with other data available from books, journals, the retail trade press, or from the archives of the Institute of Grocery Distribution in Letchworth and/or from the archives and library of the Oxford Institute of Retail Management in Templeton College Oxford. However, it is inevitable that some of the data, especially that associated with the recollections of the senior management of historic events, was taken at face value as it was often associated with internal events that were not recorded in a formal way either when they took place or subsequently.

| Organisation | Name | Position | Interview no. |
|---|---|---|---|
| J. Sainsbury plc | C. Montagnon | Informations Systems Director | JS:CM2:10:93 |
| J. Sainsbury plc | C. Baker | Systems Development Manager | JS:CB2:01:94<br>JS:CB3:02:94 |
| J. Sainsbury plc | C. Swanston | Systems Development Manager | JS:CS:06:94 |
| Tesco plc | I. O'Reilly | Information Systems Director | TE:IO:06:94 |
| Tesco plc | J. Dove | Systems Development Manager | TE:JD1:10:94<br>TE:JD2:02:95<br>TE:JD3:06:95 |
| Safeway plc | M. Winch | Information Systems Director | SA:MW2:06:95<br>SA:MW3:09:96 |
| ICL plc | P.Evans | Technical Manager Ret. Sales | IC:PE2:06:94 |
| ICL plc | R. Wilkinson | Systems Engineer | IC:RW1:06:94 |
| IBM plc | P. Rees | Mktg. Manager Ret. Sys. | IB:PR2:06:94 |
| IBM plc | F. England | Tech. Manager Ret. Sys. | IB:FE1:06:95<br>IB:FE2:09:95 |
| Siemens Nixdorf | I. Stewart | European Marketing Manager | SN:IS2:03:96 |
| Siemens Nixdorf | J. Pettinger | Systems Engineer | SN:JP1:03:96<br>SN:JP2:04:96 |

**Table 3.3 Retailer and System Suppliers interviews**

The data used to compile the histories of the companies was obtained from several sources. All of the food retailers had a form of company history. With Sainsbury and Tesco this was quite detailed and was available in book form. Sainsbury have a company archivist who was very helpful in allowing access to the Sainsbury archives, although records of past board meetings were company confidential. The library of the IGD has an extensive archive of retail journals such as the 'Grocer' that go back to the 1800s and which have regularly reported the activities of the food retail multiples. These were used to check the information in the official company histories. Some of the data gathered from the executives in the food retailers was used in the construction of the histories of the food multiples. Also several books, in particular those by Adbergham (1964), Bamfield (1980), Barty-King (1986), Briggs (1991), Hill (1990), Kirby and Rose (1994), McKinnon (1981), Matthias (1989), Philips (1992) and Waugh (1951) were very useful in triangulating general retail market information which influenced the official company histories.

To gather the data to build up a description of the retail systems two main sources of data were used. The first was the multiple retailers and the main systems suppliers (Table 3.3), the second were the systems components suppliers (Table 3.4).

The data gathered during the pilot programme enabled an approximate generic information systems diagrams to be constructed, and this was used as a basis for discussion during the interviews in Table 3.3. The interview strategy for these encounters was to use the 'neutral' generic model to build up an overall picture incrementally. This avoided the need to ask directly for sensitive information, and of placing interviewees in an embarrassing situation. The interviews concentrated on defining the retailers systems structures at Head Office, in the distribution chain, and in the store. Also the connections between the retail systems and external organisations such as suppliers and the banks were identified. As each part of the systems was defined in greater detail the relationship between that part of the system and operational strategies was identified and discussed.

During these interviews, especially those with the systems builders, it became obvious that another important source of data were system component suppliers. This was because the retail systems builders had ceased to design and build their own peripheral technology, concentrating instead on 'putting together and making the big system work'. Accordingly, a survey of a variety of technical and retail sources (magazines, journals, and exhibitions) identified many of the established leaders in their relevant fields of retail technology and software. These are identified in Table 3.4. These suppliers were interviewed during 196 and 1967. They were asked to explain how their product fitted in to the retail systems; what advantage their product gave to the systems builders; what advantage their product gave to the system users; and, if they would supply information in the form of technical performance and functional specifications. This data was correlated with that obtained from the retailers and systems builders and used to construct the description of the generic retail system described in Chapter 4.

| Organisation | Product | Organisation | Product |
|---|---|---|---|
| 3 Com Ltd.<br>Glasgow | ISDN & Data<br>Networking | Metanetics Corp.<br>Myers, Florida | ID Cards |
| AIM Ltd.<br>Hull | Retail & Dist'n<br>Systems | Metrologic GmbH<br>Munchen | Bar Code Readers |
| Astrac Ltd.<br>Leeds | IBM Training<br>AS 400 Ser. | Microsoft Corp.<br>Basingstoke | LAN, WAN & Retail<br>Systems |
| Bay Networks SA<br>Valbonne | LAN & WAN<br>Networks | Omron Electronics Ltd. | Plastic Card Systems |
| BACG Ltd.<br>Leeds | Data Warehouse<br>Software | Ouroumoff Sys sa<br>Paris | Logistics Systems |
| Brio Technology Inc<br>Isleworth | Data Warehouse<br>Software | Paradigm Tech. Ltd.<br>Wallingford | Bar Code Systems |
| Cambridge Online<br>Ltd. Cambridge | Database software | Pegasus Soft. Ltd.<br>Kettering | EPoS Systems |

| | | | |
|---|---|---|---|
| Campbell Software Europe, London | Workforce Man. Software | PMCS plc, Coventry | Store Retail Systems |
| The Checkout Centre, Dunstable | EPoS Systems | Prologic Ltd. London | Datamining Systems |
| Computeraid Services Ltd. Farnborough | Consulting Services | Project Assist Ltd. Hartley Witney | Customer Loyalty Systems |
| Epson (UK) Ltd. Hemel Hempstead | PoS Equipment and Systems | Quintek Ltd. Wokingham | Retail Information Systems |
| Group Alpha Ltd. Romford | Store Software and Systems | Radius Retail Ltd. Milton Keynes | Retail Software Systems |
| Hero Systems Ltd. Weybridge | PoS Terminals and Systems | Russet Ltd. Reading | Plastic Card Systems |
| Pearson Professional Ltd. | F.T. Reports | RTSI Ltd. Nottingham | Distribution Software |
| Holistic Systems Ltd. London | Business Intelligence Systems | Scan Coin Ltd. Salford | Coin Sorting Systems |
| ICM Security Ltd. Leeds | Security & Monitoring Systems | Santa Cruz Ops. Ltd. Watford | UNIX and Windows Systems |
| ICS plc Reading | Personnel Systems | Senn-Delaney Ltd. London | Retail Systems |
| IMS Ltd. Leeds | Voicemail & Communications | SPSS Ltd. London | Statistical Analysis Systems |
| IPC Ltd. Nelson | PoS Terminal & Systems | SWL Retail Sys. Ltd. Redditch | Service Management Systems |
| Island Pacific Corp. Wendens Ambo | Database Systems | Tabula Ltd. Shepperton | EPoS Systems |
| Ordnance Survey Southampton | Digital Maps | Tryptych Systems Ltd. Gerrards Cross | User Interfaces |
| Kronos Systems Ltd. Reading | Time Management | LIS Ltd. High Wycombe | Proof of Delivery Sys |
| Lee Integer Ltd. Kettering | Customer Counting systems | US³ Inc. Santa Clara | Smart Cards |
| Medoc Computers Ltd. Nottingham | EPoS Systems | Venners Comp. Ltd. Milton Keynes | Point of Sale Systems |

**Table 3.4 Organisations who provided technical information**

The final phase of the research was to gather broadly based information about the retailers from senior members of the three retailers who either were currently in position as director of a technology function, or who held such a postion in the past. These people had access to the strategic thinking within the organisations and were of great help in identifying critical events during the period 1980 to 1990. The interviewees were Mr. Oliver Randle a semi-retired Director of Technology of J. Sainsbury (interviews JS:OR:10:96; JS:OR:02:97), Prof. Donald Harris recently retired Technical Director of Tesco and visiting Professor of Retailing at Stirling University (interview TE:DH:03:97), and, Mr. Mike Winch who is Director of Systems at Safeway (interview SA:MW4:03:97). The interviews were undertaken using the previously described semi-structured expert interviewing approach. Each interviewee was given a list of questions prior to the interview commencing. These were as follows:

a. What kind of technology was important for (Company) in the lead up to the period 1980 to 1990 - and why?

b. On reflection, how important do you think technology was to the development of (Company) during the period 1980 to 1990 - could you give some examples?

c. Could you describe (Company) technology strategy during period 1980 to 1990?

d. How did (Company) technology strategy affect other corporate strategies during the 1980's?

e. Leaving technology aside for the moment, what other developments were going on in (Company) during the 1980s?

f. How would you describe the relationships between (Company) and its' IT systems suppliers during the 1980s?

The final phase of the research was to gather broadly based information about the retailers from senior members of the three retailers who either were currently in position as director of a technology function, or who held such a postion in the past. These people had access to the strategic thinking within the organisations and were of great help in identifying critical events during the period 1980 to 1990. The interviewees were Mr. Oliver Randle a semi-retired Director of Technology of J. Sainsbury (interviews JS:OR:10:96; JS:OR:02:97), Prof. Donald Harris recently retired Technical Director of Tesco and visiting Professor of Retailing at Stirling University (interview TE:DH:03:97), and, Mr. Mike Winch who is Director of Systems at Safeway (interview SA:MW3:03:97). The interviews were undertaken using the previously described semi-structured expert interviewing approach. Each interviewee was given a list of questions prior to the interview commencing. These were as follows:

a. What kind of technology was important for (Company) in the lead up to the period 1980 to 1990 - and why?

b. On reflection, how important do you think technology was to the development of (Company) during the period 1980 to 1990 - could you give some examples?

c. Could you describe (Company) technology strategy during period 1980 to 1990?

d. How did (Company) technology strategy affect other corporate strategies during the 1980's?

e. Leaving technology aside for the moment, what other developments were going on in (Company) during the 1980s?

f. How would you describe the relationships between (Company) and its' IT systems suppliers during the 1980s?

g. Have technology developments since 1990 progressed in the way that was envisaged - or have unexpected changes taken place? (If so, what are they?)

h. Do you think that technology has played an enabling role or a determining role in (Company) general development?

i. In your opinion, how will technology change food retailing in the next 10 years?

Question (a) was designed to confirm the issues that the organisations were facing as they entered the 1980s and was something of an icebreaker at the start of the interview. Questions (b) to (d) were designed to explore the relationship between the technology that the retailers were using and the strategies they were adopting for both technology and in the market place in general. Question (e) was designed to identify general organisational developments that were acting as a backdrop to technical change in the organisation and to permit judgement of the perceived importance of technology. Question (f) was designed to confirm opinions expressed by systems suppliers about their relationship with the three retailers. Question (g) sought to establish how accurate the retailers are at predicting technological trends and developments. Question (h) sought to establish if there had been a change in the role of technology with respect to the development of the retailers. Finally, question (i) was included to allow the interviewees to speculate on the future developments of the technology - strategy relationship in multiple food retailers. These questions were presented to the interviewees as a guideline for the areas to be discussed. At the interviews the interviewees answered the questions in whichever sequence they liked, referring to the question sheet only to ensure no issues had been omitted. Each interview was recorded, transcribed, coded to identify data that was relevant to the main themes of the research:

a. technology evolution (general),

b. technology evolution (information and control systems),

c. general retail strategies,

d. key events between 1980 and 1990,

e. the chronology of operational problems,

f. the evolution of operational strategies,

h. technology supplier relationships

i. reflections on future systems developments.

This data was subsequently correlated and used in chapters 4, 5 and 6.

In order to provide additional information about future developments of technology and strategy in multiple food retailers question (i) above was also posed to John Walvern of the I.G.D., Dr. Steve Birt of Stirling University, Dr. Jonathan Reynold of the Oxford Institute of Retail Management, John Walvern of the Institute of Grocery Distribution, and Prof. John Dawson of the University of Edinburgh.

### *3.5 Post script*

Although not formally included in the research programme, some of the operational systems and people issues were discussed informally with:

Simon Pattern, Sainsbury Store Manager, Central Milton Keynes,

Mike Gilmore, Safeway Store Manager, Westcroft, Milton Keynes,

Mike Smith, Tesco Store Manager, Kingswood, Milton Keynes.

These discussions provided another perspective on the information gained from previous interviews with managers in the retailer Head Offices. They were also invaluable in evaluating the performance measurment systems that were used by the food multiples in the stores as a whole and within individual store functions.

### *3.6 Summary*

The methodology adopted in this research provided data that allowed the relationship between information technology and retailer strategies to be analysed, and through this analysis understood. The combination of qualitative data and quantative data gathered from individuals and organisations within the theoretical framework suggested by the literature appraisal was appropriate to the objective of the research - namely to demonstrate that information technology is beginning to lead strategy in the food multiple retailers. The following three chapters analyse this data.

# *Chapter 4*

## *The Food Multiple Retail Systems*

### *4.1 Introduction*

This chapter summarises the results of the research undertaken into the retail information and control systems. The detailed descriptions of the hardware and software structures of the store, Head Office and distribution systems are contained in Appendix 1. This chapter concentrates on the structure and functionality of the systems as they relate to the operational aspects of the organisations. These give a view of the 'generic' system description developed with the retailers and the retail systems designers. Variations to this composite system were almost entirely due to the historical evolution of both the retailers and the systems, and the extent to which the retailers have modified and enhanced their systems to accommodate operational changes.

### *4.2 A system overview*

Food multiple retailers use information and technology systems extensively throughout their organisations - throughout the distribution chain to move, store and control merchandise; within stores to augment the activities of personnel; to control the communications within the retailing organisation and between the retailers and their suppliers. It is also used to communicate with customers and refine retailing operations to better meet the customers needs and to measure the performance and control the retailing management system. The food retailers use technology to enhance the efficiency of their organisations and this increases their effectiveness in the market place. A wide range of technology may be observed in the modern supermarket. Computers, automated weighing systems, bar code readers, automatic receipt printing, automatic cheque printing, store security systems, conveyoring at the check-out, air conditioning and refrigeration systems, automatic doors, dry cleaning equipment, automatic baking equipment and more. Elsewhere in the retail chain other technology adds to the efficiency of the retailer (e.g. automated warehousing facilities, EDI controlling the communications between the retailer and their suppliers). It is difficult to imagine a modern food retailing chain without technology in general and without computer systems specifically.

The histories of Sainsbury, Tesco and Safeway discussed in Chapter 5 and analysed in Appendix 2 demonstrate the importance of information systems in the growth of the organisations. In particular there is ample evidence, even in the earliest years of the history of Sainsbury, of the use of technology to improve the selling environment (e.g. refrigeration to store meats and dairy products, electric lighting to enhance the display of products and the use of steam lorries to improve the speed of distribution). *The use of these technologies improved the competitive performance of the food retailers and improved control of the retailing environment.* Good information enabled meant good control. In the very early days of Sainsbury control was obtained by standardising manual systems in all shops. Through this standardisation it became possible to measure individual and store performance, and also to enhance the co-ordination of many of the central functions by having a consistent reporting system. The use of technology, coupled with the need to constantly improve control and the shopping environment is a persistent theme in the retailers studied in the research.

## *4.3 Factors affecting food retail systems design*

Although Sainsbury, Tesco and Safeway differentiate themselves through their advertising strategies by appealing to different sectors of the same market segment, at an operational level, leaving image issues aside, they are remarkably alike. So, for instance, food retailers all need to manage the distribution chain in more or less the same way. The similarities were identified in the pilot programme during this research, a fact that had not escaped the attention of Jones (1990) who observed that similarities are greater than differences, and that the design of retail systems is converging. He goes on to assert that transaction volumes and data storage are likely to be very important in the final design of the system, an observation confirmed in Appendix 1.

## *4.4 An overview of a typical retail control system*

The role of control and information systems within a modern retail environment is complex and extensive. The core function of the information system is control of the distribution chain from supplier to consumer. Figure 4.1 illustrates a typical system found in a food multiple in which the Head Office (HO) is the centre of the control system. The HO control and information systems will be connected to the warehouses and individual stores by telephone data lines and to suppliers (farms and factories) via Electronic Data Interchange (EDI) connections. The normal stock replenishment cycle is for the store to register actual sales via the EPoS system and to pass this information to head office. The Head Office Computer (HOC) consolidates this information with information from other stores and generates stock replenishment orders sent to suppliers via the EDI links. Suppliers despatch produce to either the warehouse or in some cases (e.g. vegetables) direct to the store. At the same time they send an electronic invoice over the EDI link to the HOC. When produce arrives at the warehouse it is checked for quality, quantity, supplier etc. against data that has already been sent from the HOC about the order. The warehouse system is updated and this information is passed to the

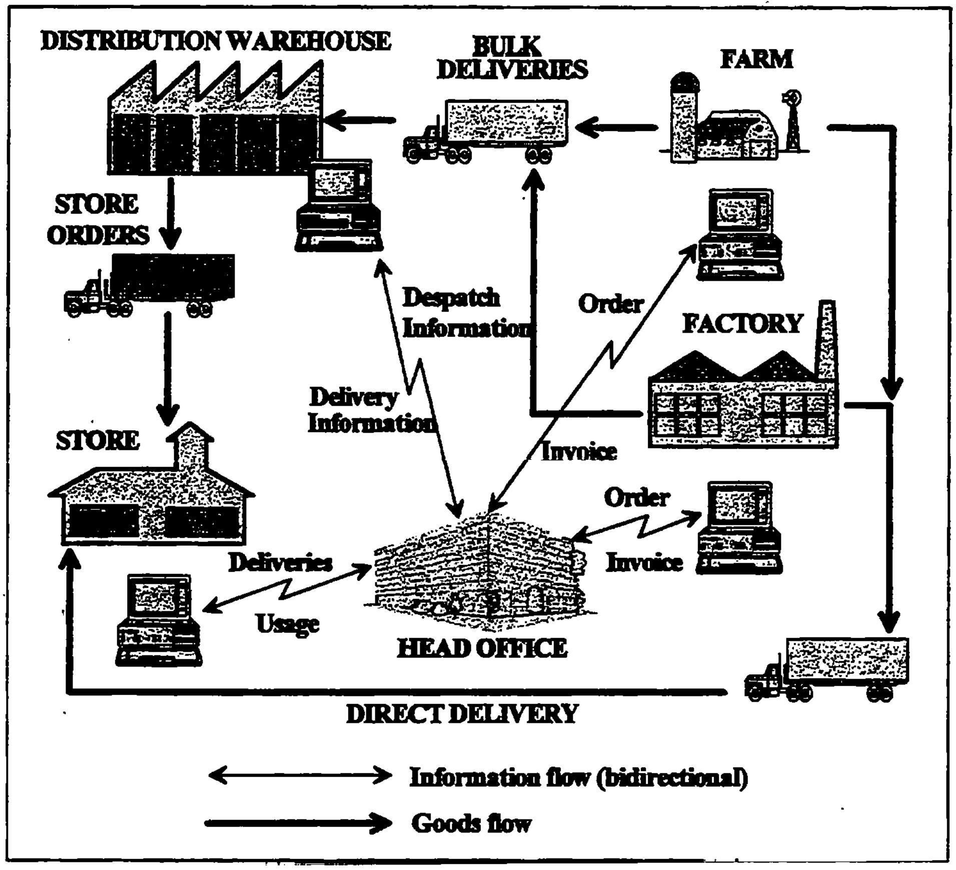


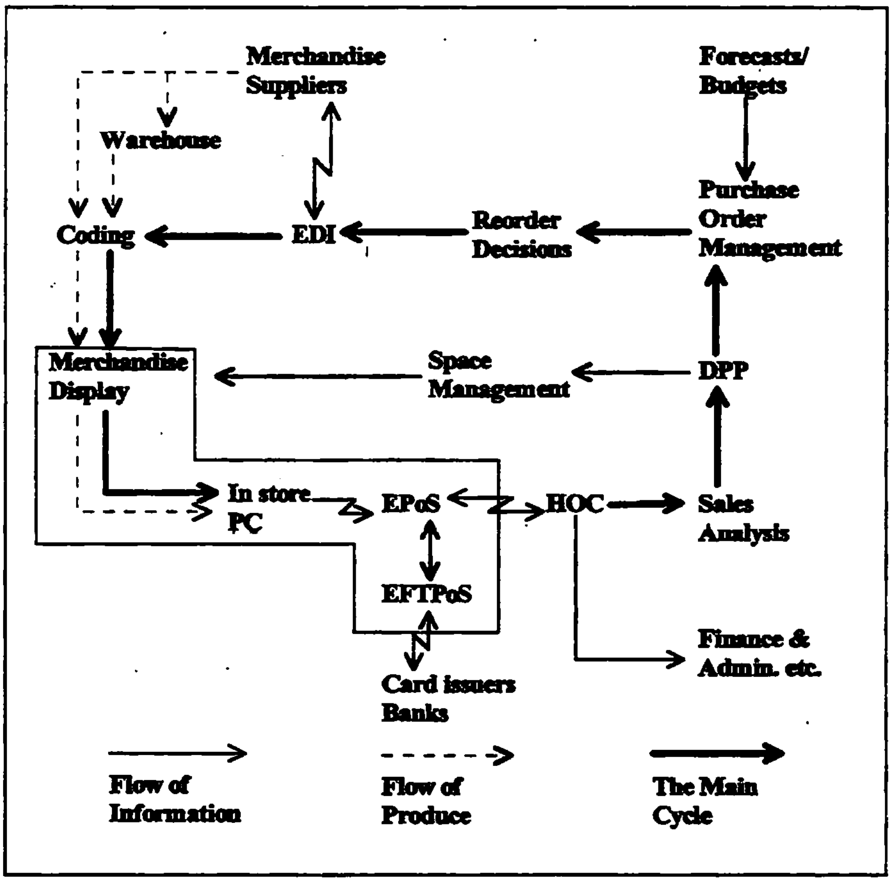

**Figure 4.1 Schematic of information and goods flow in a food retailer**

HOC and initiates payment to the suppliers. (Direct delivery payment will be initiated from the store.) Meanwhile the warehouse system allocates the stock to a storage space and at the same time generates a location bar code that is attached to the produce packaging. The produce is then moved to the pre-allocated location to await store replenishment orders. When these come from the HOC, a composite stock replenishment order is picked and prepared for despatch to the individual stores.

One lorry will normally service several stores of moderate size, several lorries may be required to service the large super and hyper stores. On arrival at the store the stock order is checked and the produce moved to the display cabinets. The stock order delivery information is relayed to HOC. By comparing deliveries and despatches or sale from the warehouse and individual stores a picture of the composite stock position is maintained by HOC. Essentially this is a Just In Time (JIT) system that works with remarkable efficiency considering the number of daily transactions that occur (in the order of millions). With produce such as vegetables this system can place orders on suppliers in the morning of a day for delivery before noon and to be placed on sale the same afternoon - a lead time of 3 or 4 hours! On other items such as exotic goods, some Just In Case (JIC) stock is normally held. The level of this stock is usually determined by the length of delivery chain. Clearly if produce has to come via ship from a remote part of the world, and the ship only visits that part of the world infrequently, stock must be held to ensure a consistent supply to the stores. The major food retailing multiples have about 15,000 stock items in their smaller stores and as many as 35,000 items in their superstores, and achieve an average stock turn of 22 (1994 Tesco company reports).

To some extent the previous description is a simplified view of the system. In practice it contains other features such as the bar coding of produce, the Direct Product Profitability (DPP) system and the Electronic Funds Transfer for Point of Sale (EFTPoS) that are identified in Figure 4.2.

The bar coding of products enables the gathering of data at various parts of the system and forms the backbone of the stock control system. For the stock control system to work efficiently it must provide data about what is in stock; data on what is being sold and where it is being sold at when it is being sold; allow good re-order decisions to be made; generate orders to be sent to suppliers; register receipt and distribution of stock throughout the system; interface with the space management and merchandising systems to allow effective stock display. In the UK the food retailers follow the standardised European Article Numbering system (EAN). Originally this coding system began in the USA. during the 1960s where it was known as the UPC. Later, it changed its identity




(Source: IGD 1988)

**Figure 4.2 Detailed Retail Information System**

when it became universally adopted as the EAN. The EAN is a 13 digit code. Digit 1 and 2 identify the product country of origin (e.g. 00 = USA, 32 = France, 05 = UK). Digits 3 to 7 identify the company making or marketing the product. Digits 8 to 12 identify the specific product (size and description) and digit 13 is check digit used to validate the code. These 13 digits will be used in their entirety within the stock control system. It should be stressed that bar codes are used throughout the distribution chain and can be adapted depending on use. For instance traded units (bulk orders) often use the ITF.14 code in which the bar code symbol is larger, more robust and contains an extra digit (Figure 4.3). Sometimes additional information is needed for tracking or control purposes, in which case a supplementary code may be added to the EAN code.

The use of bar code scanning in food retailers is extensive. In 1993 99.7% of Sainsbury stores, 97.5% of Tesco stores, and 100% of Safeway Stores used scanning equipment. The average for the grocery business as a whole was 74.1%. It is estimated that by 1997 86% of grocery stores will use scanning equipment (Nielsen, 1995, p.137). The scanners

5 012345 678900

EAN.13 Code

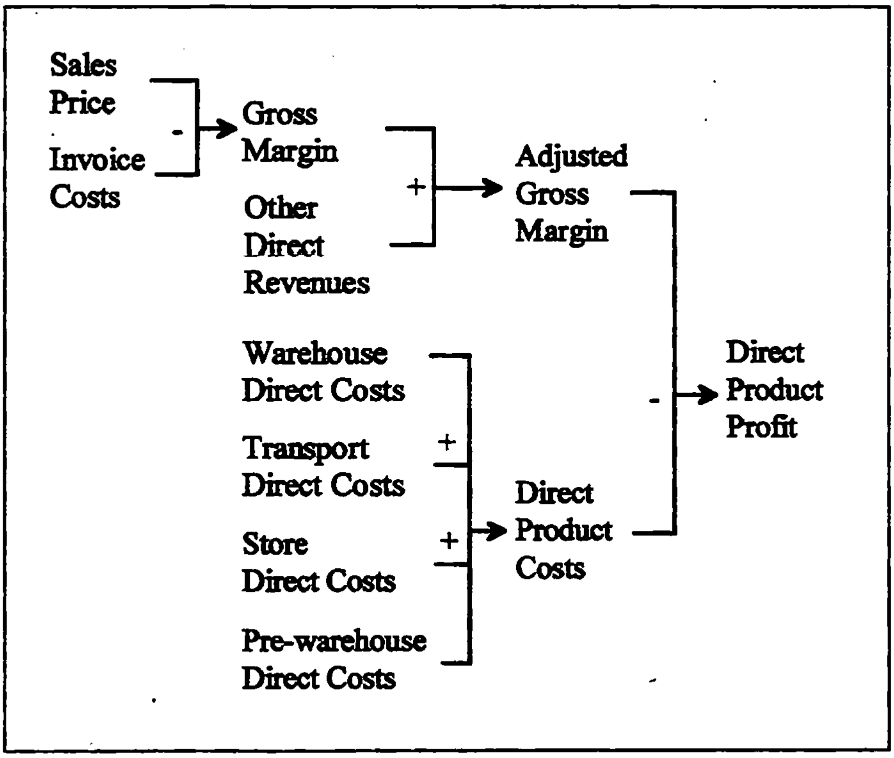
05012345678900

ITF.14 Code

**Figure 4.3 Examples of Bar Codes**

themselves have developed since their introduction in the early 1980s. Originally they were hand held Helium-neon lasers that were large, rather heavy, expensive to manufacture and used a lot of power. More recently (circa 1990) new scanning technology has been developed and the Helium-neon laser has been replaced by Visible Laser Diodes (VLD) or Charge Coupled Devices (CCD). These are small, easy to build in to equipment, cheap to manufacture and use a small amount of power. Of these features it is the cost of the scanner that has had the most significant impact on the growth in use of this technology. The actual cost of the scanning laser has dropped by over 80% between the period 1983 and 1992 (RMPD). From a practical point of view the design of modern laser scanners includes electronics and software that can recognise and decode several codes (stores sometimes use special codes) as well as coping with omnidirectional reading.

The second feature that is different between the simple system of Figure 4.1 and the more sophisticated system of Figure 4.2 is that of the DPP (Direct Product Profitability) system. DPP was originally invented by McKinsey Consultants in 1967 to replace




(Source: IGD, 1988)

**Figure 4.4 Build up of Direct Product Profitability**

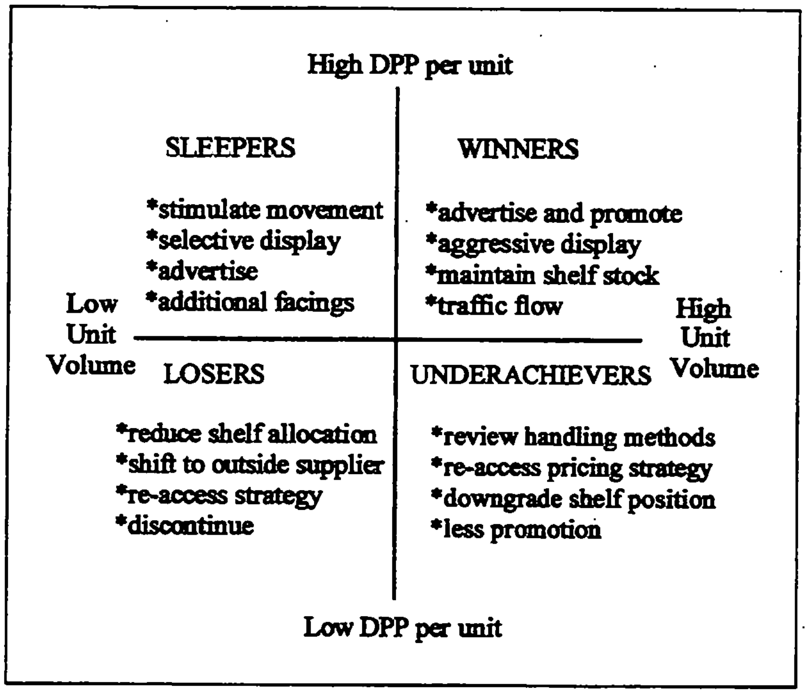
manual methods of calculating product profitability. Up to this point the food multiples used much cruder ways of calculating profit that only worked effectively at store (not product) level. DPP languished waiting for technology and ancillary systems to improve before it could become a reality. In the past food retailers have used the stock control unit (SKU) as a way of controlling stock. The SKU compares actual stock usage with the quantity of stock on the shelves and then uses a predetermined stock level to trigger an order. The stock reorder level is determined by the delivery time of stock, either from the warehouse or from the supplier. The SKU system is rather crude as it fails to take into account product size and cost relationships or other factors such as handling costs, all of which can affect the marginal contribution of a product. DPP takes all of these factors into account and a typical DPP system is shown in Figure 4.4.

The DPP analysis can lead to an accurate profit profile for each product and avoids the 'bucket accounting' approach of the SKU system. Robson (1988) identified the benefits of DPP as:

1. identification of high DPP items can lead to better and more profitable merchandising,
2. DPP can identify items with high warehousing or distribution costs and focus cost reduction activities,
3. DPP can improve shelf management by allowing the retailer to measure the relationship between the amount of space allocated to a particular item and the rate of sale of the item,
4. linking DPP with information gathered via the EPoS system enables a link between profit and demand patterns, and

5. because an accurate profit profile is generated by DPP better pricing strategies can be undertaken by the retailer.

However, Gavanagh (1987) suggested care must be taken when using DPP as its focus on the individual product can lead to distortions in the stock profile of a store. In turn this work against issues such as merchandising and store aesthetics. Also it is important that the measurement and control systems that provide data for the DPP system are




(Source : IGD, 1988)

**Figure 4.5 The DPP driven merchandising matrix**

effective (i.e. accurate costs are known, accurate figures are available for space, an effective and robust inventory management system, etc.). Even so, DPP is a better and more focused approach to merchandising (Figure 4.5) because it enables relatively simple merchandising tactics by quickly identifying which of the four categories (sleepers, winners, underachievers and losers) a product falls within. Merchandisers can concentrate on ensuring that 'winners' are kept in active stock, that promotion policies for 'sleepers' and 'underachievers' move these products into the 'winner' category, and that 'loser' products are taken from the product portfolio. It is significantly more accurate than previous approaches that relied on manual assessment of stock activities.

The third feature of difference between Figure 4.1 and Figure 4.2 is that of the EFTPoS link with the banks and financial institutions. EFTPoS was developed as a joint initiative between the clearing banks and the large multiple retailers. The target in creating the EFTPoS system was to reduce the amount of cash and cheques that had to be handled by the retailers and the banks, and at the same time speed up funds transfers between the banks and the retailers. By using EFTPoS banks save up to 40% of the cost of a transaction and most EFTPoS systems installations pay for themselves in about a year. Naturally these savings have resulted in a reduction of costs for the retailers.

The EFTPoS systems that were initially developed during the late 1980s only worked with debit cards (as opposed to credit cards), largely because the banking systems were not sophisticated enough to cope with credit and debit cards simultaneously. However, the majority of current EFTPoS systems will register transactions on not only bank issued credit cards but also a range of 'own brand' store cards. In principle their operation is simple. After the customer's purchases have been totalled up the customer offers the check-out operator their debit card. This is swiped by the check-out operator and details of the transaction are sent through the communication system into the banking network. Here the customer's coded information allows access to the current account details of the customer. Assuming that funds are available in the current account, an authorisation code is transmitted back to the retailer and the transaction is completed. At the same time funds are transferred from the customer's account into the retailer's account. As an additional check a paper audit trail is provided from the customers' point of view in terms of a till receipt and from the retailers' point of view with a copy of this receipt. Besides the saving in transaction costs EFTPoS reduces the time that the customer spends at the check-out and reduces the need for people to carry cash. In addition, the customer can use the EFTPoS system to draw cash from their bank accounts and this reduces the pressure on banking facilities. Apart from these advantages it is likely that EFTPoS is likely to play a considerable role in the future development of retail systems as its use spreads. In 1995 EFTPoS was available in 65% of all retail stores, and its use in the large food retailing chains exceeded 95% (RMPD Research).

This broad introduction to the retail systems has examined how the retail multiples structure their systems and some of the issues that must be addressed to ensure the effectiveness and efficiency of the overall business. The second part of this chapter now considers the functionality of the software at an operational level.

### *4.5 System Functionality*

Retail systems may be conveniently analysed in five interconnecting functional areas -

a. merchandising

b. retail price management

c. purchasing (part of Replenishment software - Fig. 4.6)

d. warehouse and distribution ( as above)

e. management reporting

These five suites of software control all levels of operations from corporate headquarters activities, through the product distributions systems, to individual store activities. In broad conceptual terms the complete system may be regarded as a large, distributed, dynamic, integrated database controlled by a Relational Database Management System

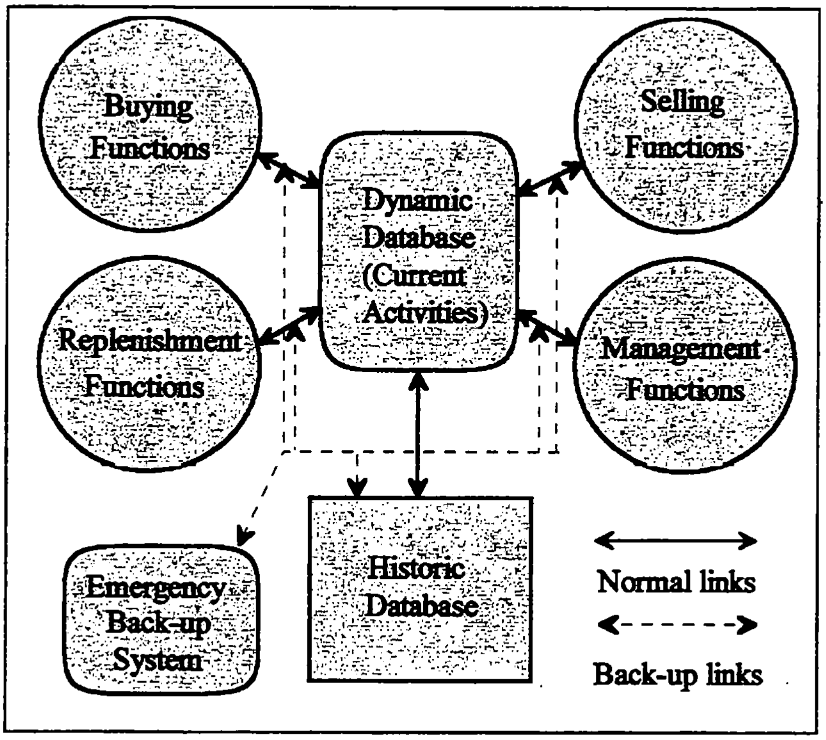



**Figure 4.6 Typical retail system functions**

(RDBMS) - the central element in Figure 4.6. The hardware on which the main database and other corporate software is located at the retailer data processing centre in the retailer's Head Office. In most systems a duplicate or back-up data processing centre willbe located remote from, but connected to, the main data centre. This is an insurance against a main systems failure. The central and back-up data centres are always located in a high security building that is capable of withstanding bombs and terrorist attacks. The loss of a data centre, for whatever reason, has the potential to cripple the whole organisation. Communication between the central and back-up computer is usually by 'Landline' - a dedicated ISDN link (usually an British Telecommunications or similar operators), or via satellite (commonly used on IBM systems).

There are two methods of data processing found in the food multiples, Batch Operating Systems (BOS), and On Line Systems (OLS). In BOS the data gathered about the store and distribution activities is collated on the store or distribution centre computer, collected via a data polling system, and processed once or twice a day. In OLS data is gathered from the stores and distribution locations and processed continuously. Most of the modern systems are OLS. Occasionally hybrid systems are found in which the main batch processing computer is run in tandem with an on line computer. The main advantage of the BOS is that data can be processed very quickly, the disadvantage is that the system can only update the peripheral systems once or twice a day. The advantages of the OLS is that data can be constantly updated in peripheral systems, the disadvantage is that a large amount of hardware and processing power is dedicated to communications. On balance OLS are preferred by the food multiples as they give a finer degree of control in the overall system.

### *4.6 The merchandising system*

The function of merchandising system is to control the variety of products offered for sale, to keep product information up to date throughout the retailing system, and to ensure that products are priced and displayed in a consistent manner in all outlets. The merchandising system may be considered at two levels. The first level is focused on Head Office activities and involves the general management of the merchandise offered throughout the organisation, the second level is associated with the management of merchandise offered at store level in the system. The merchandising database is normally maintained at the organisation's Head Office and the merchandising strategy is also determined at Head Office. Product information can be surprisingly complicated, even

| Function | Description |
|---|---|
| Hierarchical ownership | This usually defines who owns a product in the system. When new products are piloted ownership (accountability) may not reside with the store but with one of the central functions of the organisation. Alternatively some stores are zoned for the purpose of control (e.g. the Bakers, the Delicatessen, the Pharmacy), and again accountability for performance and sales may rest with a sub-manager within the store. |
| Status | With new product lines coming into the stores and old product lines being taken off the shelves all the time it is necessary to know whether product lines are 'current', 'withdrawn' or 'pending'. |
| Buyer and buying hierarchy | In most food retailing multiples buying is subdivided into product groups (e.g. tinned produce, fresh meats, herbs and spices, etc.). Most of the subgroups will have their own buying people who authorise purchasing. This will be augmented by 'super' group buyers who take an overview of several subgroups monitoring product life cycles and product balance within the merchandising structure. |
| Gross margin tolerance | Individual product minimum and maximum percentage tolerances are used to set the limits at which a product may be sold. An upper limit may be set on a product with premium pricing - e.g. the upper limit may be calculated on the basis of similar products sold by competitors. The lower limit will set the maximum discount allowed - e.g. the price of a product nearing its 'sell - by' date, or possibly where a store may have to match the petrol prices of a nearby rival store. |
| Product type and class | The product type is the description of the product - e.g. Tin of Heinz beans. The product class in the case of the tin of beans would be 'Tinned Produce' or possibly 'Tinned Vegetables'. |
| Product features | This data may be quite complex for products with lots of features - a television for instance. For the majority of food produce product features are usually confined to packaging, weight, size, supplier and possibly 'location in store' information. |
| Pack multiples | This usually describes the number of products contained in a 'pack' at different places in the distribution system. So, for instance, an item may be purchased and delivered from the supplier in thousands, then be supplied to the store in cases containing a hundred items, and on to the shelf to be displayed as individual items. Where special offers such as a 'three for the price of two' are on display that may also have implications for the remainder of the distribution chain. |
| Seasonality factor | This is often a part of the buying strategy of the retailer when product lines that are seasonally sensitive (e.g. charcoal for barbecues, Christmas decorations). Seasonal levels will be carefully defined on the basis of previous experience. |
| ABC analysis | Pareto analysis of product sales are an important part of retailing strategy. As products change their popularity this analysis enables products to be moved from one category to another for stocking and buying purposes automatically - saving buyers time and money by promoting popular stock and demoting unpopular stock |

(Source: Radius Retail Ltd.)

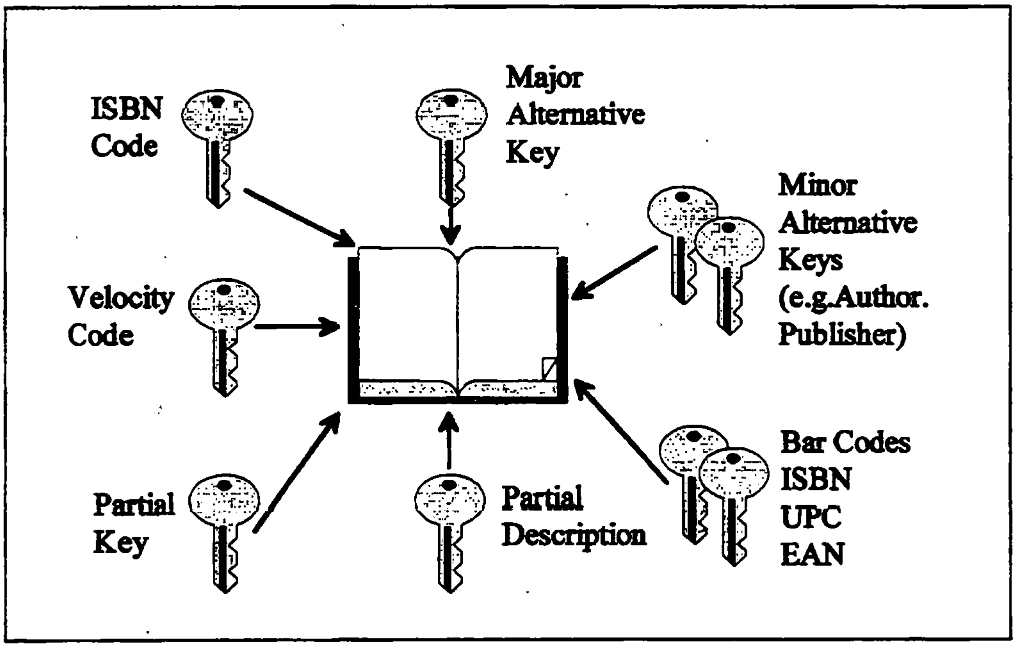
**Table 4.1 Functional requirements for merchandising software**

for apparently simple products. Most of this complexity arises from the need for accuracy in the control of products at all stages in the system. The merchandising database functional structure is described in Table 4.1. This is not exhaustive and the actual structure of the merchandising database will reflect the nature of the products and product mix sold. So, for instance, retailers who import produce will have a part of their database dedicated to items such as country(ies) of origin, currency conversion rate, delivery lead time, special shipping arrangements, tariff arrangements and so on. The key data for products will always be held at a base level although updating may done at any level in the system.

Because the merchandising system has to cope with a wide variety of products it must be flexible in application and access. In addition to the features described in Table 4.1 the merchandising system may have to contain details of alternative products or suppliers that could be used in case of problems with supply. Other details that the merchandising system is likely to contain are product variants (e.g. colour, size, weight, material, flavour, design, edition, texture - or any combination of these); templates that prompt sales assistants to suggest related buys (e.g. after buying a pair of shoes the assistant may prompt the purchaser to buy polish); multi-buys where different products may be offered in a joint purchase special promotions deal; and, pack details that are related to the different numbers of products in packs when purchased, stocked or sold.

In the merchandising system each product will have its own unique EAN (European Article Number) code or in the case of a book an ISBN number. A book sold at a supermarket may have both codes. The majority of transactions associated with the product will be completed using this (or these) code(s). However, at the store, and in some aspects of the management system, it may be necessary to identify the product in different ways or with different codes for different purposes. Some of theses different 'keys' are shown in Figure 4.7.

The availability of these alternative keys make the overall system more user friendly in that a manager could, for instance, ask for a management report based on a search word 'tea', and this may cause the system to list all items with 'tea' in their product description (e.g. herb tea, breakfast tea, special tea, etc.). Other codes (or partial codes) such as an ISBN number would allow a manager to identify a particular book (e.g. 0-07-70779991-4), or, if only 0-07 were entered, all McGraw-Hill books in stock would be listed. Of course it may be that a manager may be concerned with stock turn over and use the velocity code to identify items that were quick or slow moving. Flexibility in




(Source: Ouroumoff System SA)

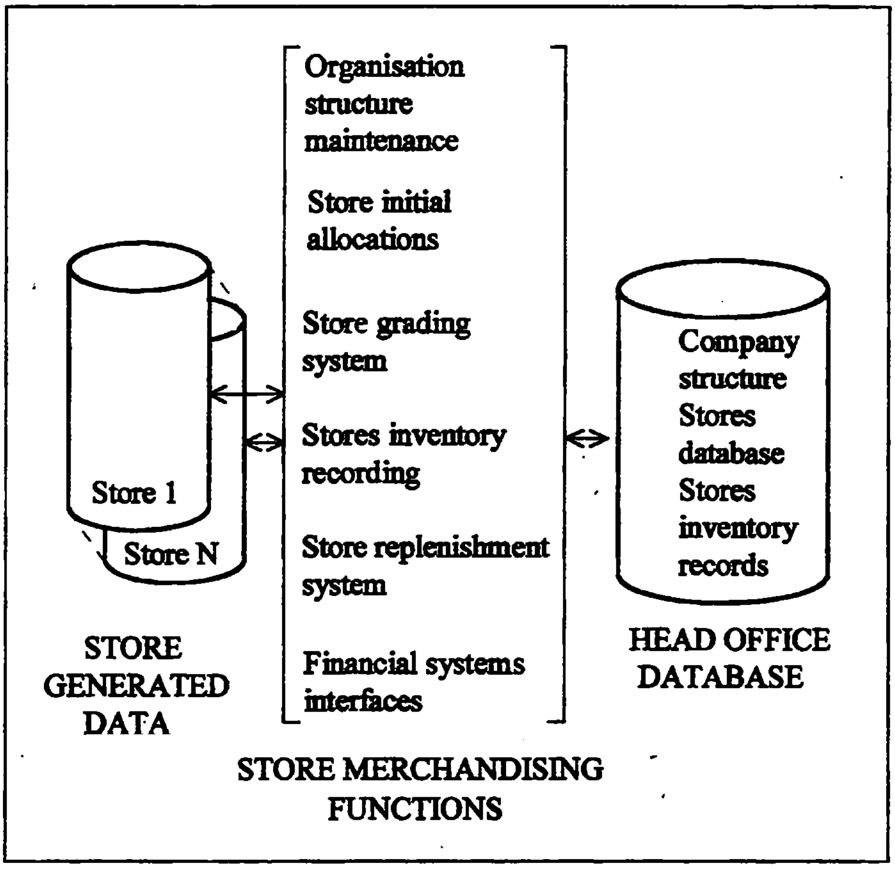
**Figure 4.7 Product Keys**

this aspect of the database configuration will have a direct influence of the overall systems usability. Most of the modern systems have multi-key access as a standard feature of the core RDBMS.

The final aspect of the Head Office merchandising system that is focused on activities in retail systems is associated with supplier information. This aspect of the database may contain data fields that describe: supplier product code; supplier reference number; EAN code; purchase or sales pack units; recommended retail price; minimum / maximum order quantity or value; minimum / maximum delivery quantity or value; manufacturer delivery / lead time; country of origin; preference ranking (often used in conjunction with ordering policy); cost and discount details and special offers; user defined fields that will be determined by the needs of the management and the business. The latter field may be used for supplier performance information, supplier status flags and similar administrative information.

While many merchandising software functions are focused on the Head Office activities, a substantial amount of software in the retail systems is focused on store merchandising activities. This software is usually called 'store merchandising' but to some extent this is something of a misnomer as the software is administered at the centre of the system not in the stores. More correctly it ought to be called 'store merchandising monitoring' as this more accurately reflects the use of the software. Broadly speaking the store merchandising software may be divided into six aspects all of which draw on the data generated by the stores in the normal course of their operations. These are illustrated in Figure 4.8.

The first aspect of the merchandising software is associated with the corporate structure. Within any large organisation, and the food retail multiples may have in excess of 300 stores, many distribution centres, and several administrative centres, there is a need to keep an accurate record of the corporate structure. The majority of the multiple retailers have a cascade structure starting at the highest corporate level and devolving through divisional, regional, area and finally store levels. The store data will record the grade of the store (usually the higher the grade the larger the store or the more prestigious the location); the store features (e.g. square footage, layout, number of floors, whether or not the store is licensed); the store trading data (e.g. trading plan, holidays, key dates);




(Source: Adapted from an RSA Systems Ltd diagram)

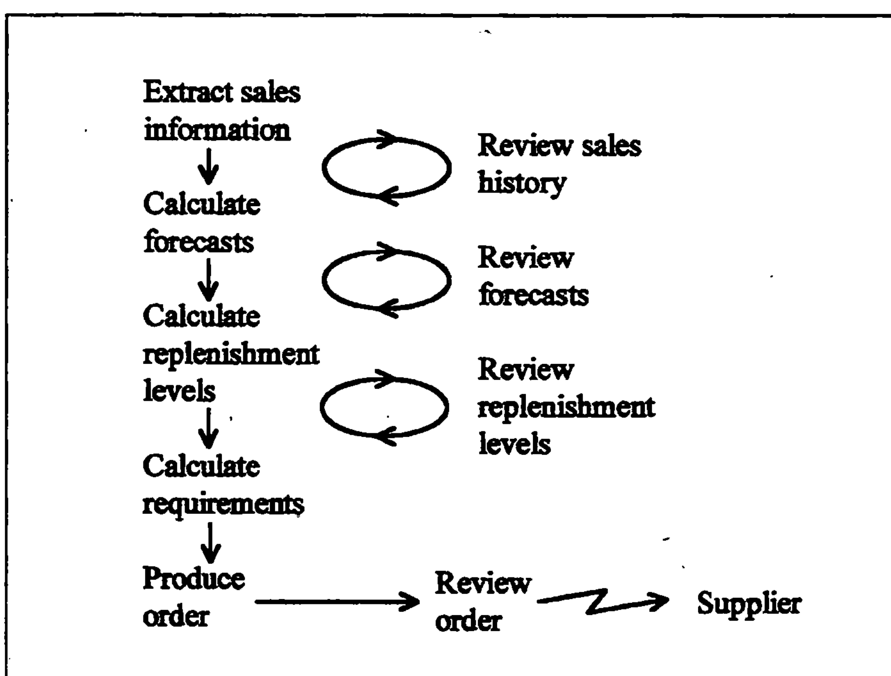
**Figure 4.8 Store merchandising functions**

the store location data (e.g. address, communication numbers for facsimile, modem and telephones, delivery route and constraints on access); the type of store (e.g. whether it is a stand alone store or a joint operation); the store personnel information (e.g. the name of the General Manager, the departmental managers, the key staff, the number of full time and part time staff, etc.); and, the store performance data (e.g. position in the 'league table'). An additional complication in many of the retail multiples at store level is the subletting of floor space to franchises (e.g. Laura Ashley operating in the Sainsbury's Do It All subsidiaries). Again, the store merchandising software must be flexible enough to cope with the continually changing requirements of the market place.

Initial allocations and store gradings are closely related aspects of the merchandising system (Figure 4.9). An initial allocation is, as its name suggests, the distribution (or allocation) of goods to stores for the first time. The precise sequence of this allocation throughout the retail system may be critical to product sales success and can be driven by several criteria. These are primarily store size and availability of shelf space or special facilities, for example refrigeration, and distribution and storage facilities in the system and in the store. Other aspects that may be taken into account in initial allocations are broader market items - for instance the willingness of people to try new produce or the correlation of population with commercial television coverage (Nielsen, 1995). Each food retailing multiple has its own system of determining the sequence of initial allocation. In general these may be classified into two types. The top - down system requires the user to input quantities required and warehouse stock retention levels, and then allocations will automatically be made by store grade downwards against previously allocated grade limit parameters. The bottom - up system requires the user to input quantities and warehouse stock retention levels, and the system calculates the total quantity required. Grade upper and lower limits are usually set by sales volume or value band.

The store inventory control cycle begins with stock deliveries being recorded as they arrive at the store. These are normally checked against store orders and shortages are recorded and fed back into the ordering system for future deliveries. The deliveries and shortages, together with actual store transactions are collected via the store EPoS system and automatically downloaded to the central systems when the store is polled by the central computer system. Stock adjustments (shrinkage, breakage, etc.) may be recorded manually or automatically, and these will be consolidated with the other information. At product and variant level the following information will be registered: current stock; stock category (e.g. free, damaged, display, transferred, quarantined); units, value and weighted average cost; in transit & on order quantities; minimum / maximum stock level; reorder quantity and reorder point. This information is usually combined into a store product catalogue that may be unique for each store, be shared by several stores of the same grade, or possibly be structured into core products common to all stores with special amendments for individual stores. New products will be added to, and discontinued products removed from, the catalogue by Head Office merchandisers who will modify the EPoS product catalogue and amend the store management system. The system must take into account store returns, whatever the reason (e.g. breakage), and keep both store and central records up to date. Finally, the store stock records must also have the provision for stock corrections that come about because of either partial or full stock audits. From the store and central management point of view accurate records are essential for the system as a whole as they form the basis of the management reporting system. In this system the data can be interrogated to provide information about actual stock in stores, transactions details (number and type), product status, stock availability, stock take-on, stock product list and stock adjustments. These reports are used regularly by store managers to monitor store activities.

Stock replacement information is derived from EPoS data gathered during normal trading. Reorder level information will be calculated either manually or automatically, and be reviewed regularly and adjusted on the basis of current usage. Adjustments to stock level may also be driven by a variety of other factors - seasonal profile (e.g. increasing stocks of chocolates before Christmas and Easter); trading plans (e.g. holidays); product substitutes; and, key dates (e.g. back to school). Most merchandising system reordering processes are monitored by algorithms that allow actual trading data to be smoothed and a variety of forecasting methods (i.e. average, weighted average,




Source: Ouroumoff Systems SA

**Figure 4.9 The order processing cycle**

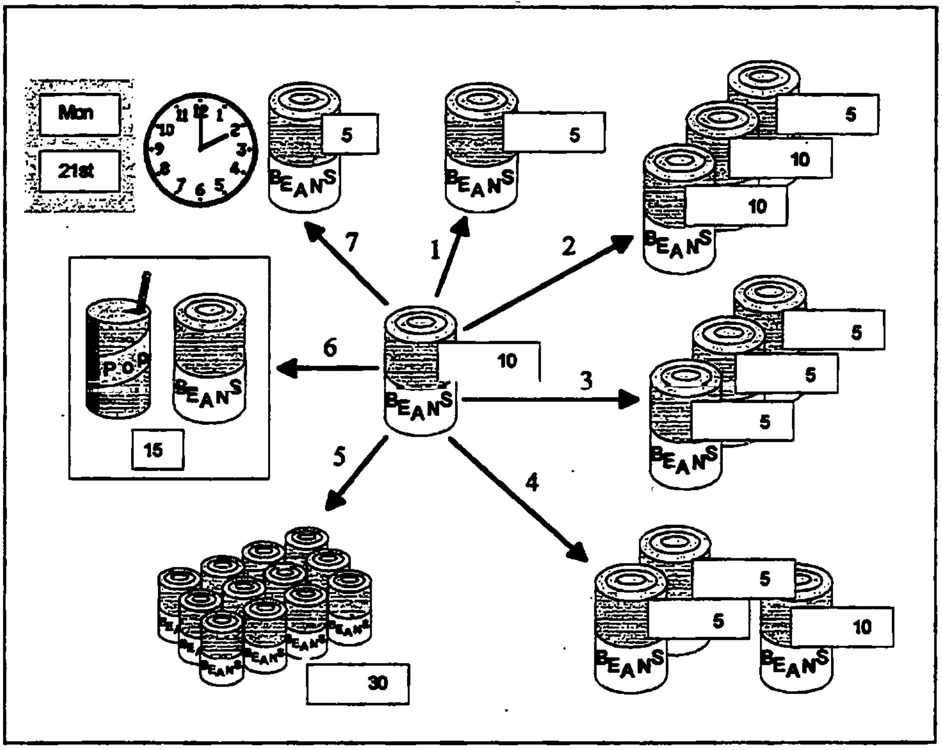
regression or exponential smoothing) to be used for product planning and ordering. Figure 4.8 illustrates a typical order process that uses these kinds of techniques.

The merchandising software is one of the most critical parts of the retail system as it controls the range and volume of products on offer, and it also drives the purchasing system of the retailer. In many systems the merchandising software was historically the first to be installed. As a consequence in many of the older multiple food retailers this software contains many idiosynracies that are difficult to explain in strictly logical terms but which can be understood in the context of the evolution of the specific organisation. However, the aspects of the merchandising system previously described are common to the majority of food multiples and form the base upon which the remainder of the systems are designed and operate.

### *4.7 Retail price management*

The price management software suite has the primary function of protecting the margins of the business by maintaining accurate pricing. It interfaces with the merchandising software to ensure the right price is on the right goods and that the price is in line with merchandising plans. It also interfaces with the purchasing software in order to keep the prices charged for products up to date. The product pricing software has to cope with an unusually dynamic situation in the food multiples. Figure 4.10 illustrates some of the product pricing options that the software has to accommodate.

The tin of beans at the centre of the diagram has a normal price of 10. Option 1 is this same tin of beans at a price of 5 - a simple and automatic discount. Option 2 is called' table pricing' - if two tins are bought for a price of 10 the third tin costs 5. Option 3 is called 'quantity pricing' - if three tins are bought at once each tin costs 5. Option 4 is called 'restricted quantity pricing' - only the first two tins are discounted to 5, successive




Source: Adapted from Siemens Nixdorf, Calypso pricing diagram

**Figure 4.10 Product pricing options**

tins will cost 10. Option 5 is called 'case pricing' - if the whole case is bought the price is 30. Option 6 is called 'deal reward' pricing - this could be buy a tin of beans and a can of soft drink and pay 15, or alternatively the may be buy a tin of beans and get a can of soft drink free or at a discount. Option 7 is called 'date and time' promotions - the can of beans is discounted to 5 on a particular day, possibly at a particular time. A tour of most food multiples will produce examples of these (and other) pricing options and they are an important means of attracting customers to the store.

A cost and price breakdown suggested by Ouroumoff Informatique Synform (1996) is -

**GROSS PURCHASE PRICE**

(minus) Promotional discount

(and / or minus) Regular discount

(and / or minus) Trade discount

(and / or minus) Exceptional expenses

(and / or minus) Special deals

(and / or minus) Specially negotiated orders

(plus) Taxes

(plus) Other expenses

(plus) Transportation

---

**= COST OF MERCHANDISE**

(plus) Depot to store transport cost

(plus) Management cost

(plus) Head Office price adjustments

(plus) Other costs

---

**= SELL / TRANSFER PRICE**

(plus) Mark-up

(plus) VAT

(plus) Store promotional overhead

---

**= RECOMMENDED NET RETAIL PRICE (Inc. Tax)**

Clearly arriving at a price is quite a complex process in the first instance and one that involves a significant effort to keep it up to date. Getting the price right will have a significant competitive impact and may be closely associated with organisation strategy. An example of this is the way in which UK food multiples discount petrol prices in order to attract customers to their store - where they make their profits on the sale of their food and other products. It is the responsibility of the central merchandising department to get the price right.

The pricing database holds key cost and price data for each product in stock. These will be aggregated into retail price lists that may be general for the whole of the food retailer organisation, focused on a geographical or national region(s), or be discrete for an individual store - or combinations of these depending on the merchandising strategies and tactics being employed at any particular time. The key data usually contains a reference code and description, the start and end dates for which a particular price is valid, the purchase price, the standard selling price and variations on this price for which the product is sold (e.g. promotions, competitor), the currency in which the product is bought, and details of sales taxes that may be due (e.g. VAT). The prices contained in this data will have been calculated (see above) to maintain the margins required by the organisation. Variations in actual selling price that transgress these pre-set margins will generate warnings at the store and Head Office. A product price may change several times within the product life cycle. These changes are notified to each store each day. When stores have closed to the public price changes are made manually on the shelves. It may be in the future that this will be done automatically when electronic shelf edge labels become the norm and 24 hour opening means that manually changing prices is not a practical proposition. In addition to instigating manual changing of price information the price maintenance system updates the EPoS system at the checkouts. In this way when trading begins on the following day all pricing information will be co-ordinated.

There are additional complications to pricing when trading across international boundaries and it may be necessary to keep price catalogues and sales tax information in several languages. It may also be necessary to adjust prices for currency fluctuations on a daily basis. The complexities of the international trading situation are reflected in the fact that nearly every system examined has historically had a different approach to performing these tasks. However, within the past four or five years specialist software houses have developed international trading packages that are rapidly becoming adopted as the standard throughout the industry. The issue of international trading is very much a current one in the food retailing multiples as many look abroad for expansion faced with a saturated home market.

### *4.8 Purchasing*

The purchasing suite of software is, as has already been described, closely linked to the merchandising and price maintenance suites. Functionally it will place orders, prompt orders based on established reorder levels, and keep supplier details up to date. In order to complete these tasks, a supplier database is maintained that will have the following data structure: supplier name, address(es) and contact(s); supplier type, class, category and status; supplier code(s); Dun and Bradstreet credit rating; min/max quantities and values; buying method (e.g. manual or electronic); credit & payment terms; invoicing methods; product(s) supplied; additional costs or discounts; lead times; carrier details & charges; language for transactions; electronic communications details (e.g. 'phone, fax).

There are three basic methods of purchasing produce. The first is by *purchase order* in which a fixed quantity of product will be ordered and scheduled for delivery at one or multiple dates. The second is by *purchase contract* in which produce is 'called off' a forward contract with the supplier and each 'call off' will be logged for auditing purposes. The third method of purchasing is by a *purchase requisition* for a one-off delivery that is usually placed at the store level direct with the supplier. This system may be used where store managers are allowed to buy local produce. Whichever method of purchasing is used the purchase status, or protocol, must be observed by the person or system placing the order. This status defines the way in which the order is policed. An *open order* would equate to a call off situation usually used for staple products (e.g. tins of beans, cereals). A *closed order* would only apply to a one-off purchase. A *cancelled order* would usually apply in the case of supplier default (e.g. non delivery). A *completed order* may signify the termination of purchase contract or possibly the final stage of a phased delivery plan. An *authorised order* will stipulate who is to authorise the order. This may be linked to volume, value or special conditions (e.g. a previously delinquent supplier is placed on trial for a time). In some cases special passwords are required to be given by the authoriser. If orders are normally placed over an Electronic Data Interchange (EDI) system auditors may require a sample of orders to be printed and this would become a *printed order*.

Once produce enters the depot or the store, suppliers invoice the retailer either electronically or manually. In the normal course of events electronically tendered invoices will be matched against delivery information and paid. Where there are shortages or returns of the product the supplier will have a flag set on their account and this will normally trigger a manual check before the invoice is paid. As all suppliers are not connected through EDI there are inevitably paper invoices to be manually processed. The percentage of paper invoices that the food multiples have to process is quite low (between 20 and 40% of all invoices) and is likely to continue to drop. Most of the food multiples now insist that new suppliers have EDI connections (and may even provide them free to small suppliers). By pursuing this policy Sainsbury, Safeway and Tesco believe that under 10% of their suppliers will be sending paper invoices by the year 2000. From these companies' point of view the EDI strategy saves a lot of money as manual processing of invoices is expensive.

Because of the problems that are associated with controlling the large number of items the food multiples sell, a wide range of reports are automatically generated on demand by the purchasing suite. These include reports on outstanding purchase orders; recommended replenishment orders; recommended replenishment stock; availability schedules; delivery schedules; purchase order summaries; purchase order forward commitment; shortage reporting; imminent delivery information (at store and depot); stock availability; stock transfers; cancellation reports; and various supplier performance reports. Normally these reports are generated on request from either the store manager or Head Office and can be configured to give both historical analysis and projections.

### *4.9 Warehouse and distribution*

There are four basic requirements that the warehouse and distribution software has to meet. Firstly there is a need to control the physical storage of the stock within the depot or warehouse. Secondly the changes in stock must be monitored and controlled. Thirdly, the distribution of stock to the stores must be ordered and controlled. Fourthly returns from stores or depots must be controlled and stock adjustments made.

The physical control of stock in the depot or warehouse requires a precise record to be kept in order to locate stock in the system. Each depot or warehouse will have its own unique physical layout and is usually divided into zones, areas, and then subdivided into aisles, rows and bins. The nature of the depot or warehouse tends to determine the exact physical layout. So, for instance, most depots have special zones associated with different temperatures. Tesco depots have four different temperature zones for different products - a -15°C zone for frozen produce, a -5°C zone for chilled produce, a 5°C zone for greengrocery and an ambient temperature zone for the remainder of the produce. This gradation of temperature allows the produce to be kept at optimum storage temperature and enhances the product shelf life. The corollary of this situation is that delivery lorries also have the same temperature controlled partitions. Temperature controlled zones are only one example, other zones will be required for bulk delivery, marshalling for despatch and despatch to stores. Some warehouses have zones dedicated to third party transient storage/repacking operations. The stock management software will be required to register inputs to the system and the physical or automatic placement and retrieval of the stock, into or from locations that may be defined by the automatic system or by manual allocation. Each stock movement within the warehouse must be logged by the system, together with precise stock description details. In general the majority of the stock will flow smoothly through these systems, however, from time to time the system may have to change stock status flags for special events or because of special storage conditions. This could happen when an stock audit is undertaken, when stock is impressed for quality reasons, or for delivery to a bonded part of the warehouse as would be the case with beers, wine and spirits. In this latter case the software may have special functions that are associated with Customs and Excise duties and licensing and transport arrangements.

The goods receiving part of the system must have an effective 'handshake' with the previously described purchase order system. The first task of the this part of the system is to reconcile deliveries with orders. If the delivery is reconciled then the products may be moved into the storage system proper. If not, as may be the case with shortages, part deliveries and damaged products, the system must either update the purchasing system, inform the vendor to arrange future collection, and organise the movement of the delinquent stock into a holding area to await collection; or, allow a part delivery to be stored and processed in the normal way. Replenishment of stock will either be driven by manual ordering - as would be the case with new or trial products, or by automatic ordering controlled by an algorithm within the software. In practice Sainsbury, Tesco and Safeway all have composite replenishment systems that allow a great deal of flexibility. This is ideal for the buyer, but represents significant control problems for the software. Replenishment order parameters are usually set by maximum/minimum criteria, ideal stock level, economic order quantity or reorder point.

The majority of stores stock replenishment is driven from the EPoS systems within each individual store. EPoS data is passed from the store to the warehouse system and is used to generate picking lists for the manual and automatic retrieval system. The sequence of picking is worked out automatically by the warehouse computer system to minimise picking time. Goods are then picked and assembled for the store in stillages. The pattern of stillage filling is usually driven by the store layout (e.g. one stillage may contain cheeses and delicatessen produce, another clothes, etc.) and by doing this, unnecessary handling at the store is eliminated. Stillages are then assembled for despatch and held in marshalling areas that correspond to the temperature requirements of the produce. The complete order is final assembled in the lorry itself. The lorry storage space is divided into temperature zones (sub-zero to ambient) to maintain the produce at its optimum storage temperature. Frozen produce is loaded first, chilled produce next, cool produce next and finally ambient temperature product last. Normally a lorry will deliver a discrete load for a given store, although the lorry may shared if two smaller stores have to be serviced. The only exceptions to the EPoS initiation of the store order will be generated by the merchandising system when new products are introduced or other products are de-listed.

Other stock movements, that are driven by central requisitions (rather than stores requisitions) are those of inter-warehouse transfers (sometimes called consignment stock). This kind of stock movement is identical in all respects to the store stock movement except that it is instigated by the central food retailer computer system, or manually through the merchandising system.

All systems require stock checking facilities. With so many product lines and such large volumes of products moving through the distribution system, or waiting to be delivered to the stores, regular stock checks are an essential part of the system. Stock checks may be conducted on a total stock, random stock, selected stock or on a cyclical basis. The warehouse software must be capable of accommodating any of these systems. Most stock checking is manual with the sample to be taken being identified by the system itself. Updated stock data is usually entered through a terminal in the warehouse or, as most commonly the case, with a hand held terminal that can be connected to the main system, and which automatically downloads its data. Some of the sampling stock check systems will automatically trigger another immediate search if more than a pre-set level of stock discrepancies are detected. Sometimes this may prove to be adequate, however if the second stock take is not satisfactory a full stock take will be implemented. The food retailers were reticent to disclose the level of errors that are typically found in their warehouse stock control systems, but system suppliers suggest that the level of error that would trigger a second or subsequent stock take is 1% to 2%.

The final aspect of the ware house system is that associated with returns. It is almost inevitable that returns will be generated from the store or from the warehouse. In the first instance the returns must be accounted for in the global count of produce in the system and adjustments made where appropriate. Secondly returns information must be entered into the suppliers' record in the merchandising system for supplier performance purposes into the purchase system for top-up reordering. Temporary space (or an impress area) will be allocated to the returned stock where it will be held until arrangements can be made for its return to the supplier. The system must control this storage and also generate the paperwork required to return the goods. If the retailer returns the goods the supplier will be charged for the delivery. Some stock will not be returned but will be destroyed or dumped. Again, the cost of doing either of these things will normally be charged to the supplier. Return agreements vary between the food multiples but will usually contain details of who will pay for freight, how claims are to be submitted and which cost base is to be used, whether approval is required or not, and the return address and contact details.

### *4.10 Management reporting*

All of the multiple retailing systems have sophisticated management reporting systems. In general the management reporting structure operates at three levels. The first level is the operational level and is focused on the store and the distribution system. The second level is the corporate level and is focused on Head Office and global activities. The final level is focused on the systems monitoring, maintenance and development. The majority of the reports in the system are pre-formatted during the initial systems design or during subsequent systems development. Some reports will be user defined at the point of request. These latter reports are more likely to be requested by systems people than operational managers. Data for reports is constantly gathered from manual and automatic (e.g. EPoS) inputs throughout the system. In BOS this data is collected and processed each night, and all reports will be updated once a day. In OLS data is either constantly updated with all reports correct to the last data entry, or - as is more often the case - processed periodically throughout the day meaning that the report is more accurate. Key report data, after processing, will be sent from the central data warehouse (a term used for very large databases) to the operational or executive serving system where it will be held, usually on a satellite system file server database, for interrogation and report formatting when and if required. For special reports that arise from a non-standard request there may be a delay until the data needed for that report is downloaded from the central computer database. At the store level this means that the data relating to the regular trading activities of the individual store will be updated, no more than 24 hours old, and be available for analysis. The same will be true for all operational systems. Long term analyses of the data, or parts of the system, may be done by accessing the main database and its archives. With so much data available, searches of historical data have to done using special fast data search techniques, sometimes called data drilling or data mining. At the executive level reports are usually based on exception reporting - again with fast search capability. These reports focus on trend analysis and performance against target reporting.

All of the levels in the system have interfaces with other standard software packages such as word processors and spread sheets. In this way individual managers can prepare their own reports and do their own analyses. Not all managers have access to all information. There is always restricted access. Individual non-management employees will have the lowest level of access, managers the next highest, directors the next and the systems support personnel the highest of all. At the highest level there is full access to all aspects of the system including overriding all security systems. Naturally there are only a few people in any of the retailers who have this clearance.

A great deal of effort is made by report designers to make reporting user friendly. Graphics are used extensively to display data. In general Graphical User Interfaces (GUI) are used to access the system, and this allows a 'point-and-click' approach that most managers are comfortable with.

In addition to these five basic system other ancillary systems are to be found in different parts of the system. For instance in the store there will be personnel control systems for time checking and management; there may be customer counting systems that count customers as they arrive and leave and prompt the store manager to open or close checkout positions; or there may be basket analysis system that analyses customer purchases and prompts the adjustment of store shelf layouts or product grouping to capitalise on buying behaviour patterns. In the warehouse or depot a great deal of research and analysis had led to special software that manages storage systems in a more efficient manner, and reordering algorithms that reduce stock holding.

### *4.11 Corporate management software*

The corporate management software suites includes the previously described basic five functions and have many common elements:

- A financial control system (e.g. financial ledgers, payments and receipts, budget setting and monitoring, pricing structures, rebates, asset registers and management store and corporate financial performance measurement).
- A distribution system suite (e.g. stock received, stock returned, stock transfers scheduling and stock allocation, distribution system performance measures)
- A merchandising system (e.g. purchase order management and EDI control, stock and replenishment control, the DPP control suite, stock taking and stock reconciliation, pricing management, promotions planning and analysis, supplier returns and supplier performance analysis, advertising planning and analysis, merchandising planning, sales analysis and feedback).
- An EPoS monitoring system (e.g. communication costs, store and total system performance monitoring, file and data analysis, event logging)
- An EFTPoS monitoring system (e.g. communications costs, store and total system event logging, auditing and reconciliation).
- A reporting system (e.g. store monitoring and performance feedback, warehouse/depot monitoring and performance feedback, supplier monitoring and performance feedback, management variance reporting).
- A personnel system (e.g. wages and salaries, pensions, training status, education evaluation and monitoring, attendance records, staff development programmes)
- A customer relations system (e.g. customer profile analysis, customer buying pattern analysis, customer loyalty schemes, customer communications).
- A corporate suite (e.g. shareholder records, archives, consolidated accounts information, statistical analysis, market research activities, treasury activities, competitor analysis).

- A store planning and maintenance system (e.g. new site planning, evaluation and acquisition, planning liaison, civil engineering, store maintenance).
- Communication systems.
- An overseas operations suite (e.g. exchange rate monitoring, overseas branch supply and monitoring, overseas transport and logistics).
- A partnership suite associated with joint ventures (e.g. in store banking, franchising and franchisers).

Other software functions not included in this list are usually associated with the special requirements of a particular food multiple.

### *4.12 Conclusions*

When considered in their entirety (including the information in Appendix 1) the operational and managerial information and control systems are simpler than they at first appear. The systems are designed for robustness in operation at all levels and the food multiples have no illusion as to their level of dependence on the systems. Robustness appears in stable and well designed software code, operational involvement in the design processes, critical hardware duplication, and extensive user training in the use of the systems (Swanston, 1994; Dove, 1995; Winch, 1996). Information is the 'oil in the engine' of the food multiples. These large organisations need accurate information to manage their operations, to maintain their level of service to the customer and to improve their performance in terms of efficiency or effectiveness.

Given the broad sweep of technology and software that go to make a modern food retailing system it is no surprise that few, if any, individuals - even those in directorial positions - have a complete picture of how these information systems work. This is as true of the systems suppliers as of the food multiples who use the systems. If there are people who come close to a broad understanding they are the fairly small group of peripatetic systems designers and programmers, who move between the large systems suppliers, designing and modifying systems (Pettinger, 1996). This is not to suggest that the systems users and suppliers do not have people who can perform these design and programming tasks, or maintain the systems once installed. They have and they do, but these people tend to specialise on one aspect of the greater system, for example communications processing, and in doing so lose familiarity with and knowledge of those aspects of the system that they do not normally come in contact with. *As the retail systems increase in size and complexity, and the overall rate of technical innovation increases, there is a real danger that they will become unmanageable.*

The computer based retail information systems have grown in fits and starts. In the 1970s system design and evolution was dominated by the large systems builder. The retailers bought a package in which the system supplier dictated the hardware and software used. If the retailer wished to use hardware or software from other suppliers it had to comply with system builder standards and interfaces. This pattern of system supply dominated the UK (and the US) market until the early 1980s. Then two developments changed this situation. The first was the emergence of small OEM suppliers (often companies set up by ex-employees of the large system builder) who produced technically superior hardware products, for example EPoS terminals, at prices much less than those of the large systems builders . The second development was the increasing popularity of the UNIX operating systems software and 'open' systems gradually came to dominate the market. Once adopted, the open systems architectures positions - have a complete picture of how these information systems work. This is as true of the systems suppliers as of the food multiples who use the systems. If there are people who come close to a broad understanding they are the fairly small group of peripatetic systems designers and programmers, who move between the large systems suppliers, designing and modifying systems (Pettinger SN:JP1:03:96). This is not to suggest that the systems users and suppliers do not have people who can perform these design and programming tasks, or maintain the systems once installed. They have and they do, but these people tend to specialise on one aspect of the greater system, for example communications processing, and in doing so lose familiarity with and knowledge of those aspects of the system that they do not normally come in contact with. *As the retail systems increase in size and complexity, and the overall rate of technical innovation increases, there is a real danger that they will become unmanageable.*

The computer based retail information systems have grown in fits and starts. In the 1970s system design and evolution was dominated by the large systems builder. The retailers bought a package in which the system supplier dictated the hardware and software used. If the retailer wished to use hardware or software from other suppliers it had to comply with system builder standards and interfaces. This pattern of system supply dominated the UK (and the US) market until the early 1980s. Then two developments changed this situation. The first was the emergence of small OEM suppliers (often companies set up by ex-employees of the large system builder) who produced technically superior hardware products, for example EPoS terminals, at prices much less than those of the large systems builders . The second development was the increasing popularity of the UNIX operating systems software and 'open' systems gradually came to dominate the market. Once adopted, the open systems architectures almost eliminated the stranglehold of the old systems suppliers, and the role of these suppliers changed to become system integrators. There was a time in the early 1980s when it might have been possible for the food multiples to undertake this role themselves as the systems were relatively simple compared with those of today. However the food multiples, while major users of the systems, have never seen themselves in the role of systems builders or integrators, and this opportunity passed. By the late 1980s the food multiples systems were becoming very sophisticated. The traditional large mainframe computers were gradually being replaced with multiple processing arrays and the processing became distributed through out the system. These developments at once harnessed the enhanced processing power that became available through the development of the PC and the data capture abilities of the EPoS technology.

Arguably the most significant technological advance of the 1980s was EPoS. It was the key that unlocked ordering systems integration with suppliers; accurate stock control within the store; enabled the evolution of the distribution systems; and, through EFTPoS allowed the direct linking of the retailers with the banking systems. Many of the retail system innovations of today can trace their roots, directly or indirectly, back to the EPoS concept. *With hindsight it is clear that the real value of EPoS is that it changed management's view of technology from that of a reactive tool to that of a proactive tool.* In doing so it changed the way in which the food multiples were managed forever. When examining the data gathered for this chapter it became clear that the concept of EPoS is so closely woven into the fabric of the food multiple management system that they would be unable to function without it The 1990s have capitalised on the EPoS legacy by using the EPoS data to interpret the present buying patterns of customers and to create new marketing and merchandising opportunities for the future.

Prior to 1950 the technology used by retailers had little impact on management or on strategy, and was viewed as useful but not critical in the running of the organisation. A few basic computer based information systems operated at store and Head Office levels in the organisation but these systems were peripheral to the main management activities. The attitude of managers to technology seems to have been ambivalent rather than hostile. Between 1950 and 1970 the food multiples grew in size and complexity. The manual methods of controlling the retailer operations were becoming increasingly inefficient and expensive. This created an environment where technology was viewed in a more enthusiastic light by managers at all levels in the food multiples. Once technology, in the form of computers, began to do some of the more mundane arithmetic and to improve efficiency, some managers at Head Office began to realise the potential of the technology. However, the computing technology was not particularly sophisticated or reliable. In the 1980s, as has already been noted, the shortcomings of both hardware and software were eliminated and it became clear to all management in the food multiples that a future without technology was not a practicable possibility. This brings us to the modern systems that have been described in this chapter. *With evidence of such sophistication in systems technology, and of its widespread use at every level and in every aspect of the food multiples operations, it not unreasonable to argue that the balance of operational control in the food multiples has shifted from management to technology.* In general this kind of observation is met with a firm rebuff from non-technical managers who still appear to have little understanding of the pervasive nature of the technology in their organisations. The technical managers are uncomfortable about admitting that it might be so for fear of setting off technophobic reactions among their colleagues. These problems are poorly understood in the food multiples and undoubtedly deserve further investigation. Meanwhile the food multiples continue to invest in newer and more sophisticated systems, and not to invest in the technical literacy in the general management cadre. It is possible that in doing so they may be storing up problems for the future.

Having described and explained the function of the various technology systems that may be found in food multiples, the following chapter analyses the wider growth and development patterns of the food multiples.

# *Chapter 5*

## *Sainsbury, Tesco and Safeway: Environment, Patterns of Evolution and Strategy*

### *5.1 Introduction*

The main focus for this chapter is the analysis and synthesis of the data gathered about the development of Sainsbury, Tesco and Safeway that is chronicled in Appendix 2. The first part of the chapter explores the changing retail environment that is portrayed within Appendix 2 seeking to identify the dynamics that shape the interaction of the organisations and the evolution of the information systems that are central to this research. The second part of the chapter examines the historical data to determine the patterns of food retailer evolution and the way in which information systems have helped the food multiples to control operations and evolve competitive strategies.

### *5.2 Environment*

From a general perspective a study of the evolution of industrial and commercial enterprises in the UK from the mid 1800's onwards, leads to a picture of atrophy in the manufacturing sector and growth in the retail and service sectors (Mathias, 1967; Briggs, 1985; Sigsworth, 1990). Clegg (1977) argued that as the United Kingdom was the first nation to have an industrial revolution it was not entirely surprising that they were the first to experience the decline in manufacturing vigour. While the decline in manufacturing can be traced to lack of investment, lack of innovation, poor management, poor training and a lack of export performance (Briggs, 1956; Wilson, 1965; Mathias, 1993), it would be difficult to level the same criticism at retailers. In general the retail sector has prospered, but this prosperity has not been evenly distributed. Table 1.1 demonstrated that the larger retailers have grown in size and status while the smaller retailers have declined in both number and influence. Initially the decline in the small trader was due to the food multiples offering lower prices due to higher levels of efficiency and size related bargaining power. However, as long as retail price maintenance (RPM) was in force, the smaller food retailers could compete with the larger food retailer reasonably well. The large food multiples response to RPM was to introduce 'own brand' produce to avoid direct comparisons with branded food prices. As a result of heavy political lobbying by Tesco, Sainsbury and other food retailers during the early 1960s RPM was removed in 1964. It was this and the increased mobility of the shopping public that Walterss (1985) suggested finally sealed the fate of the small retailer.

In general writers agree that the post WW2 period has been the most significant in the food retailing environment (Bamfield, 1980, pp.33-4). The large food multiples have grown larger and in the process more efficient. These multiples have innovated in almost every aspect of their operation, supply methods and supplier relationships, distribution systems, packaging, store layout, product innovation, technology, store size and management systems. It is these investments which have really secured the market position of the large food multiples and the continued decline of the smaller retailers. Clearly these general observations are useful in that they set the scene for the histories described in Appendix 2, but what can be learned from the histories themselves?

*5.3 Evolution*

low. It has been able to take a long term view of the market because they were owned and dominated by one family for a long time. Even now, when the company is publicly owned, the Sainsbury family retains a substantial share holding. John Sainsbury quickly established his market niche in the 'high quality - value for money' food market, and never lost sight of this successful formula. This, combined with tight central control of costs, buying and distribution, made them one of the most profitable food retailers in the UK for a long time. This position remained unchallenged until in the late 1970s early 1980s, Tesco, freed from the dominance of Jack Cohen (their founder and Chairman), launched a concerted attack on Sainsbury. While Tesco had had more stores for quite a long time they had never been able to match Sainsbury's profitability at the store level. The reasons for this are quite complex and lie in the infrastructure of the company itself and in the companies undeserved 'middle to cheap' end of the market image that it inherited from its early trading days, and which it has never been able to quite shake off.

Both Sainsbury and Tesco have similar roots in that they originated in London, had a single entrepreneurial founder and began trading when the population was expanding in their locale. Both Sainsbury and Cohen worked long hours and ploughed their own money back into the business in order to grow quickly. Unfortunately the histories of these companies do not give any insights as to the motivation of the original founders. Indeed, the founders of both companies remained private figures, preferring to be at the hub of their expanding empire than courting publicity. In this respect Sainsbury was unlike other retailing entrepreneurs such as Tommy Lipton who positively courted publicity (Waugh, 1951). Within the companies, both Sainsbury and Cohen clearly understood the importance of creating a good company infrastructure. Having an efficient supply and distribution system was essential to keeping their customers satisfied.

A good management control system helped to keep the organisations on the financial tracks. Staff training and insistence on standards of hygiene and presentation have also been a big factor in the evolution of the companies. All of these issues still feature in the annual company reports as matters of comment.

Sainsbury and Cohen as entrepreneurs in food retailing are not unique by any means. Strong parallels to their companies development and individual characters can be found in other food retailers such as Liptons. The Thomas Lipton story, as described by Waugh (1951) began in Glasgow rather than London. However, the same pattern of astuteness, diligence and reinvestment lead to a meteoric growth pattern that took him from his first single small shop that opened in Stobcross Street in Glasgow on May 10th, 1871 to a national network by 1914. Lipton also became famous for his tea (another of his entrepreneurial ventures) which became a national commodity in the nineteenth century. Unlike Sainsbury and Cohen, Lipton was more of a showman. He was well known for his publicity stunts - making the largest cheese in the world, taking part in high profile yachting races, lavishly supporting charities. However, these were never designed for self aggrandisement but to promote his business. Lipton lived for his business and unlike Sainsbury never married.

The success of retailing entrepreneurs such as Sainsbury, Cohen and Lipton has been in their willingness to break out of the mould of the small retailer, find a formula for success, and then single-mindedly to follow it. Their risk has been offset by a protected home market and in the case of Sainsbury and Lipton during their early stages of evolution, low rates of tax that enabled rapid expansion.

The same pattern of development does not apply to the Argyll Group. In nine years it has emerged from fairly obscure beginnings to challenge Sainsbury for second place in the food retailing hierarchy in 1997. Argyll cleverly built a very wide geographical trading base everywhere but in the hotly contested London and Home Counties market. They waited until their supply and control infrastructure was well established before buying Safeway, and then had the management skills and resources to mount a serious attack on the 'big two'. Their attack occurred at a point in time (c. 1989 - 90) when the market was polarising and space was being created by the rapid demise of Gateway (Table 5.1) and the steady decline of the smaller multiples, co-operatives and independents.

In addition to illustrating the change in relative position of Safeway, Table 5.1 also gives some valuable insights into the changing nature of the food retail market between 1987 and 1991. The companies that operated in the upper quartile (Sainsbury, Tesco, Safeway, Waitrose and Marks and Spencer [not included in these figures]) all grew consistently. The companies that operated in the lower quartile (Kwik Save, Asda, Morrison (also Aldi and Netto who are not included in these figures) also grew consistently. The companies who have traditionally traded in the middle sectors of the market (Gateway and Co-op) have declined. This is evidence that the food retail market had begun to polarise towards the end of the 1980s, and a recent report from the IGD (Superstore Trading Profiles, 1995) confirms this process of polarisation has continued into the 1990s.

*The effect of the polarisation of the food multiple market has been to increase competition within the upper and lower quartiles rather than between the upper and lower quartiles.* In the upper quartile success has been closely allied to accurate identification of customer lifestyles and shopping habits, and in this respect information systems has played, and continues to play a major role.

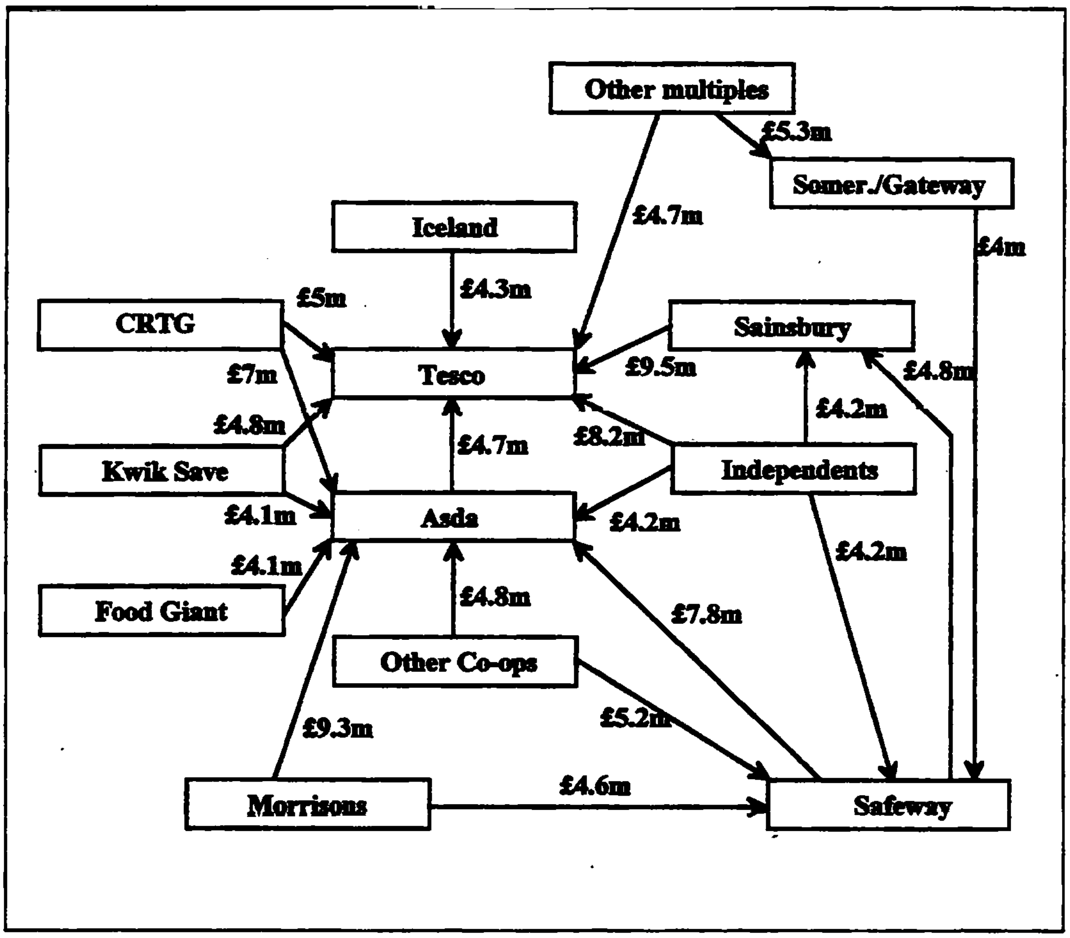
Competition, sometimes intense and cut-throat, is a recurrent theme in the histories of the food multiples. When a company has a substantial percentage of the market (as is the case with the organisations investigated) it would be understandable if an element of

| | 1987 % | 1988 % | 1989 % | 1990 % | 1991 % |
|---|---|---|---|---|---|
| J. Sainsbury | 13.9 | 14.3 | 14.5 | 16 | 16.7 |
| Tesco | 13.5 | 14.3 | 14.9 | 15.3 | 16.2 |
| Safeway (Argyll) | 9.9 | 10.9 | 11 | 11 | 11.3 |
| Asda | 7.6 | 7.8 | 7.9 | 10.5 | 10.5 |
| Gateway | 11.5 | 11.8 | 11.2 | 8 | 7.3 |
| Kwik Save | 3 | 3 | 3.5 | 3.9 | 4.4 |
| Waitrose | 2.7 | 2.6 | 2.6 | 2.5 | 2.5 |
| Morrison | 1.6 | 1.7 | 1.9 | 2.2 | 2.3 |
| Iceland | 0.5 | 0.6 | 1.8 | 1.9 | 1.9 |
| Other Multiples | 7.7 | 5.2 | 5 | 1 | 3.2 |
| Co-op | 12.1 | 11.7 | 11.3 | 11 | 10.7 |
| Independents | 14.6 | 11.4 | 14 | 13.7 | 13 |

(Source: Verdict, IGD Research Services)

**Table 5.1 UK Grocery Market Share, 1987 - 1991**

complacency was in evidence in managerial attitudes. With the food multiples the reverse is true. The interviews with the managers and directors of the companies left an abiding impression of urgency and a deep concern about what competitors are doing. In this respect one of the major paradoxes of the food multiples emerges. It would be consistent with intensely competitive commercial situations for information about sales and operations to be a closely guarded secret (other that at a headline level in company reports and accounts). The reverse is true and the food multiples release large amounts of trading data to organisations such as the IGD, AGB and Nielsens who process it in order to give relative market positional data. Figure 5.1 is a good example of such comparative data that illustrates the winners and losers in the 1996-97 trading year. They indicate who they have gained from or lost business to who. Two things are remarkable about this data. The first is the speed at which the data has been processed (March - March trading data available in July); the second is that the data (generated from till roll gains and losses) is released at all.




(Source: AGB Till Roll Share, March 1997)

**Figure 5.1 Till Roll Gain/Loss Analysis, Net switching over £4m, 1997**

This paradox is reflected in other areas as well. The food multiples meet on a regular basis to discuss technical matters (including information systems development) and to establish or discuss operational standards and future technical developments and opportunities. What is not so clear is whether these meetings discuss the strategies of the participants, and/or whether they constitute a kind of cartel. If this were the case, on a purely hypothetical level, it would help to explain why price competition (on a limited range of produce) has been such feature of recent market tactics in the food multiples - in that it enhances the public view of apparent competition, without actually seriously damaging the commercial prospects of the organisation. In a near monopolistic situation co-operation is a better strategy where product differentiation is low and where price competition would lead to market instability. An alternative view, and perhaps less controversial, is that the food multiples are all facing similar challenges and that they do need a common approach to shared problems. Some of the current problems they face are:

- Traffic congestion is causing average roads speeds to fall and urban parking and access restrictions may constrain the development of new stores.
- Pollution caused by vehicles, in particular diesel vehicles, in terms of noise and fumes is meeting with increasing public concern.
- The environmental impact of packaging used in the supply chain is increasingly becoming the subject of legislation in the EC. (e.g. The weight of packaging will have to reduced by 40% and 8% of packaging material will have to be recyclable by 1998.)
- Recycling of waste is becoming an economic practicality and new approaches to waste disposal and packaging design will have to

be developed. The retailers will have to pay as much attention to the backward passage of waste as to the forward passage of produce within the system.

- Alternative or additional distribution methods may have to be developed in response to the rising fuel costs associated with road transport.

Other areas of common interest are varied and include a broad spectrum of technology and control systems and new trading formats. The current technology, described in Appendix 1 and discussed in the previous chapter, has already been of benefit to: vehicle routeing, scheduling, automated storage and inventory systems, new warehouse configurations, EDI, sales based ordering, and in-store operations management. In the future Barnes, Dadomo and Turner (1997) suggest the remaining challenges likely to yield the greatest benefit are in the supply chain. They identify intelligent tagging, vehicle tracking and distribution support technology as being the key innovations to achieving these benefits. Intelligent tagging will help to eliminate the problems associated with keeping track of produce in the supply chain. This will reduce 'lost' stock that is still a problem in spite of much improved warehouse control systems. Vehicle tracking and satellite communication improvements will allow more accurate control of stock in between suppliers and warehouses, and warehouses and stores. These improvements are likely to have a significant long term impact on distribution efficiency as traffic congestion becomes more acute.

### *5.4 The future*

New trading formats, in particular remote shopping, are currently the subject of much interest in the food multiples. With so much invested in the large store format the multiples are strategically vulnerable to new shopping formats. As a consequence nearly all of the multiples have invested a great deal of money in catalogue and mail order shopping, TV shopping and home delivery options. The take up of these options will be closely linked to the bifurcation of the market discussed in the introduction to this research, (i.e. those who have time to shop but no money, and those that have money but no time to shop). Which will prove to be supportable with the current food multiples cost structures remains to be seen. What is clear is that if home shopping is demanded at a significant level the food multiples will have to reconfigure at least a part of their systems to cope with it. Gathering the customer's orders is a relatively simple problem to overcome, the challenge will be to find economic picking, packaging, handling and distribution systems. If these problems are overcome then the food multiples will remove the final reason for using small retailers - individual service - and eliminate them completely. It is likely that shoppers who still prefer to shop themselves are likely to be offered more facilities under the same roof (e.g. Cafés, GP surgeries, Opticians, Dry Cleaning, etc.). What is known is that the food multiples have invested huge sums of money in their stores and distribution systems. These assets still have a considerable life and managers are likely to be trying to make these assets 'sweat' for the foreseeable future.

### *5.5 Investment and patterns of evolution*

Chapter 4 demonstrated the importance of information technology to the complex trading patterns of modern food retailing. Establishing these information systems requires a major investment initially, and ongoing investment to keep the systems up to date. The need to service investment capital influences the level of risk that any organisation can take. The innate conservatism of the food multiples institutional investors inevitably tempers entrepreneurial attitudes and constrain directorial actions. The institutional investors require long term plans, precision, clear goals and regular dividends. They are bureaucracies that expect to see systems and structure in the companies they invest in. On the other hand the retail entrepreneur wishes to respond quickly to market opportunities or opponents activities with the minimum of argument and discussion. Mintzberg and Waters (1989, p.270) recognised this emergent tension between the entrepreneur and the constraints that large investors impose and commented

> "Instead of one individual being able to change his or her mind, the whole system must be redesigned. Thus, despite the claims of flexible planning, the fact is that organisations plan not to be flexible but to realise specific intentions. It is the entrepreneurial strategy that provides flexibility, at the expense of the specificity and articulation of intentions."

The issue of entrepreneuralism is inextricably intertwined with the history of the food multiples studied. Sainsbury and Cohen in particular, were not in the habit of committing their ideas for the future to paper for anyone other than their closest confidants. Until the company flotation in 1973 the direction that Sainsbury's took in developing their business was essentially a family affair. However, the overarching strategic themes in Sainsbury's have always been growth and efficiency. Cohen also had to dilute ownership when he began his main growth cycle in the 1970s and the Tesco strategic themes have been broadly the same as those of Sainsbury. The absence of, vagueness about, or unwillingness to discuss strategic thinking says much about the almost neurotic view that the food retailers have of the world. The current directors of the retailers that were interviewed (Montagnon, 1993a; Winch, 1993) had an obsessive secrecy about strategies (although both said they had them) that seems to be the result of the intense competition the intense competition and rivalry that exists between the food multiples today and in the past. This secrecy makes direct comparisons of current Sainsbury, Tesco and Safeway strategies in a documentary form impossible. However, this problem can be overcome as a great deal of information about Sainsbury, Tesco and Safeway operational activities is a matter of public record and past analysis. This information, together with the interviews detailed in the methodology, and the histories of the three organisations, make it possible to deduce the food multiple's changing strategic and operational foci.

### *5.6 The journey from the market stall to international food retailing multiple*

The case histories of Sainsbury and Tesco show a remarkably consistent pattern of evolution that may be described in five phases:

- the entrepreneurial phase,
- the early bureaucratic phase,
- the bureaucratic phase,
- the systematic phase,
- the restructuring phase.

During the early phases of its development Safeway evolved by amalgamating companies that had already been through the first two phases of this development pattern. This different pattern of development will be considered later.

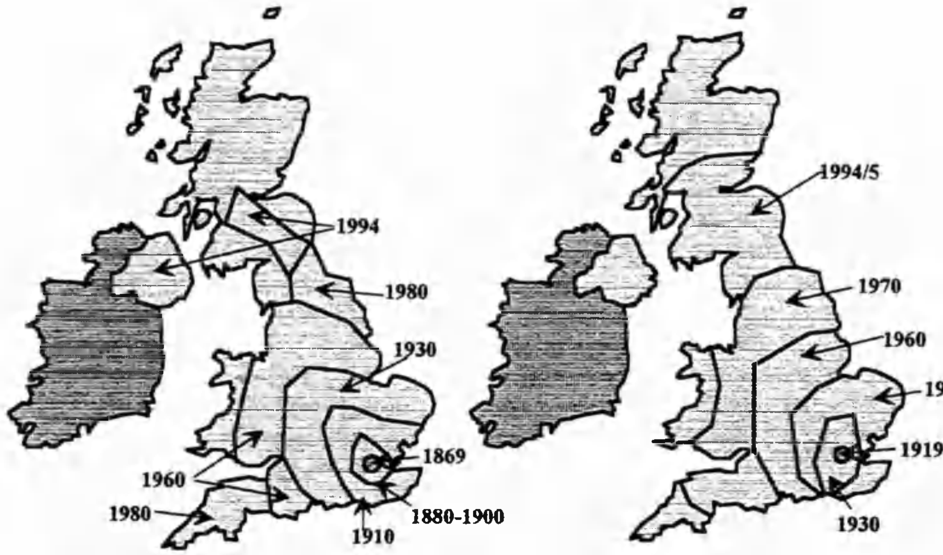
The five phases of food retailing are to some extent not time dependent. A comparison of Sainsbury and Tesco shows that both companies passed through the same sequence of phases, but at chronologically different times. However, the speed of evolution may vary radically and this will be influenced by many factors - the ability and ambition of the managers, the availability of finance, the merchandising skills of the company, the ability to control the supply chain, the rate of geographic expansion, the ability to win a market share from competitors, and the ability to pay for and the availability of information technology. Progression through the phases would transform a food retailer from a market stall to a multinational food multiple.

Both Sainsbury and Tesco began in the *entrepreneurial phase* in which they made their transition from what Mintzberg (1994, p.209) describes as a 'visionary' organisation to a 'learning' organisation. For the food retailer this phase is characterised by opportunism and unstructured or semi-structured marketing approaches. In some instances, as with Jack Cohen, the open market stall was the starting point. In others, as with John Sainsbury, a small shop is the starting point. At a general level in this formative phase the emergent food retailer has to define its market niche and a create a platform on which to grow. Several alternative product mixes and trading formats may be experimented with before an acceptable one is found.

Food retailers in this phase of their development are a 'local market' phenomenon. Both Tesco and Sainsbury only stayed in this phase for a few years, and once their trading format was defined, refined and was stable enough to be built upon, began to enlarge their trading to a wider geographic area, albeit within a few miles of their point of origin. The speed at which this was done was very dependent upon the sources of funding for the exercise. If the process of expansion was funded by profits it took a long time, if profit was used to service borrowing it was completed relatively quickly because of the gearing effect (i.e. £1 profit can service £10 of loan capital). The geographic growth pattern of Sainsbury and Tesco, illustrated in Figure 5.2, clearly show that the speed of growth is linked to which of these philosophies the entrepreneurial manager chooses to adopt. Sainsbury during their early phases of evolution favoured growing on profit rather than borrowing and subsequently grew slowly. Tesco favoured growth on borrowing or on ownership dilution, and they grew more quickly.

As store numbers increased the need for more effective centralised control and distribution systems began to be evident. In the case of Sainsbury the response to these problems was to centralise his distribution system and introduce standards for many operational aspects of the stores. He introduced food hygiene standards in display and preparation, a standardised shop layout, standardised training and conditions of employment. These standards were maintained through a system of inspectors. In the case of Tesco, Cohen's response to the emerging control problems was to encourage individual store managers to act in an entrepreneurial way and manage the shop as though it were their own. Unfortunately for Cohen many of his shop managers took this too literally and began to treat the shop money as their own. Cohen eventually reacted to these problems and he too began to introduce manual control systems that included regular book keeping and inventory control at both the store and the central depot in north London.

Towards the end of this phase the entrepreneur may have as many as 10 small or medium sized stores (5-7,000 sq. ft.), be employing 15 to 20 Full Time Equivalent (FTE) people in the stores, 5 to 10 people in warehouse and distribution activities, 2 to 5 people in administration functions and may be turning over £1m to £3m. *The entrepreneur is no longer managing the store they are managing a business*. Store management becomes devolved; security of supply becomes a major consideration; trading will move from a




**SAINSBURY GROWTH PATTERN**

**TESCO GROWTH PATTERN**
**Including the 1995 William Lowe acqisition**

(Source: Company Reports & Accounts; Official Company Histories)

**Figure 5.2 The geographic growth patterns at Sainsbury and Tesco**

cash base to a credit base; stock location and control requires a stable and structured approach; stock security and losses in the supply chain and store become more important to control; and, cash flow and stock turn becomes increasingly important to control as money becomes locked up in stock. The control issue becomes increasingly important and management have to begin to evolve a simple but effective performance measurement system that is focused on key operational activities. These are all difficult issues to overcome and require the management of the organisation to learn new skills and develop new techniques.

It is unlikely that the food retailer will have any clearly defined long term strategies at the stage of their evolution. Towards the end of the phase they may be starting to evolve operational strategies, but the lack of Head Office expertise and the focus imposed by the entrepreneur makes it more likely short term planning takes precedence.

To move to the next phase of development the food retailer must have -

a. a viable trading formula that is profitable and which will sustain growth,

b. a viable product mix that will satisfy customer's needs,

c. an adequate network of suppliers,

d. an adequate distribution system,

e. good financial management and stability to underwrite credit needs,

f. availability of premises (or land), and

g. a demonstrable ability to manage the business.

The *early bureaucratic phase* is characterised by the evolution of the individual operational control systems that are associated with the store, distribution and the administrative functions. Standardisation of procedures and processes within the business becomes an important activity. Through standardisation the managerial workload can be reduced while at the same time ensuring that a sound basis for future control systems is built. Control systems will be refined, extended, and begin to produce information in a more timely and accurate manner. Examples of this would be the reporting period falling from a month to a week, or the production of reliable store stock statements that can be used for inventory checking and security purposes.

The transition to a larger 'corporate' format of trading means that management begin to be more conscious of market image. This image is important for two reasons. The first is the ability of the corporate livery to project the right image to the customer and attract them to the stores. The second is to establish a credible image for investors as this stage of the food retailers growth is likely to require external funding in terms of long term loan capital.

Because overhead costs are spread over a wider operational base and buying power increases, profit margins tend to increase during this phase. With this increase in activity the trading base becomes capable of supporting a separate central management structure. The creation of this management structure is essential for better control of the business. This change is also an important precursor to spreading the geographical trading area. The extra profit generated during this phase of evolution is required to invest in control systems, infrastructure and higher inventory. Money to acquire or build property is often not readily available and further borrowing or ownership dilution is required. Performance measurement in the core functions becomes more important to ensure that working capital is used as efficiently and effectively as possible. Unwillingness to dilute ownership may causes growth to become a very protracted process. This phase is quite long, often more than ten years, sometimes much longer.

By the end of this period the food retailer would have up to 25 store of medium to large size (7,000 to 15,000 sq. ft.), employ 75 to 150 FTE's in the stores, 10 to 20 people in the distribution chain, 5 to 10 people in a by now separate Head Office, and have a turnover of between £6m and £25m. The problems that begin to emerge toward the end of this phase of development are often associated with the operational control systems being dis-integrated - under or over stocking at all levels in the system is not uncommon, ordering gets out of synchronisation with usage, merchandising gets out of synchronisation with advertising. The problems are usually crystallised by managers as 'communications problems' but they often cannot articulate where the exact source of the problems actually are until they can understand the bigger picture of the business.

To make the transition into the next stage of corporate evolution the following conditions must be met -

a. a stable cash flow must be established,

b. the supply chain must be stabilised,

c. the control system must be stable and effective,

d. credit lines and/or finance must be secured, and

e. the management team must be in place and able to grow with the business.

The third phase of retail development is *the bureaucratic phase*. In this phase continued geographically growth, usually projecting the food multiple into regional operation, highlights the need for integrated systems. The basic stand-alone systems of the early bureaucratic phase need to be integrated in order to keep the overheads associated with data acquisition and handling down. Performance feedback needs to be quick and accurate, and the physical aspects of the retail network need to be kept under tight control if efficiency is to be maintained.

Systems integration is a prerequisite for cohesive organisational and operational strategies to begin to emerge. During the bureaucratic stage the food retailers begins to meet organised opposition in terms of other similarly size groups of traders. Although the food retailer may have established a reputation for a characteristic product mix and trading style - Sainsbury specialised in dairy produce and bacon and fostered an orderly style of trading, Tesco specialised in tea trading with a 'pile it high and sell it cheap' approach to other produce - competition with the other organised food retailers begins to take place on a wide range of standard produce that is difficult to differentiate in terms of quality or content. These non-specialist trading lines become the battle ground in which price becomes a major differentiator. Which produce to use in these price skirmishes is heavily dependent upon accurate knowledge of current stock movements, changing price patterns and an ability to maintain a product mix that generates enough profit to continue with the constant theme of expansion. It also requires the trading environment to be closely monitored in order to reduce waste and improve efficiency. Without a merchandising strategy that is fed by accurate data from trading activities and from environmental events the organisation will be severely disadvantaged. Without a distribution strategy to ensure that the merchandising strategy becomes a reality the organisation will be similarly disadvantaged. Finally, unless adequate operational performance measurement system is instituted the whole system is unreliable and unstable.

This phase, dominated by the need to consolidate the organisation's market position, seems to be a long one. Many organisations may never transcend regional status. A pattern that has evolved in recent years is for food multiples to consolidate regional trading on an area defined by commercial television coverage. For example the East and West Midlands ITV area includes Shropshire, Hereford and Worcester, Staffordshire, Derbyshire, West Midlands, Warwickshire Leicestershire, Gloucestershire, Oxfordshire, part of Buckinghamshire and part of Northamptonshire (Nielsen, 1995, pp. 32-33). The move to wider geographical operations is usually accompanied by an increase in the average store size. Smaller shops will be replaced by larger stores and thus it is possible that the number of store does not increase much but the trading square footage does.

This mode of operating is very susceptible to changes in the geographical micro-economy. However, once established, the regional food multiples can be remarkably stable but are always liable to predation by the national operators, especially if ownership is diluted and in the hands of institutional investors. The stability of the regional mode of operation lies in the closeness of the management of the business to their market and the focus of the business on a regional market niche. This focus means that a limited product mix is required and in turn the control systems, although needing integration, can remain quite small and be cheap to maintain. Once the management control systems are integrated with the operational control systems the basis is formed for the next phase of evolution if there is the management will to achieve it. However, the transition to national coverage is unlikely to take place in one move. With Sainsbury and Tesco expansion took place in a series of waves that spread from the London centre of operations (Figure 5.2), with each wave taking from 10 to 20 years to complete. In a way this transition bears many of the characteristics already described in the move from the entrepreneurial phase to early bureaucratic phase. With each wave of expansion the control and merchandising systems have to evolve to cope with; increasing trading volumes, probably an increasing number of products sold, and an increasing need for regional trading variations.

By the end of the bureaucratic phase the food retailer will be established as a 'multiple' with a clear market image in the geographical area in which they operate. They will own around 80 stores (between 15,000 and 25,000 sq. ft.), employ about 1000 FTE's in the stores, employ 50 to 100 people in the supply chain, employ 50 to 100 people at Head Office, and be turning over between £80m and £150m. The problems that are becoming apparent have two basic sources: the increasing volume and variety of produce sold, and the need for an integrated system. In the first instance the growth in store size means that the supply system has to cope with a much wider variety and greater volume of produce, the merchandising system has to manage a larger portfolio, and the purchasing system has closely monitor actual sales of produce to avoid over or under ordering. Without integration of the separate operational systems, sales and control data has to be passed between the systems manually which is inefficient, expensive in terms of labour, prone to error, and likely to be untimely. EFTPoS systems will almost certainly be used during this phase but it may only be linked to the ordering system internally and the clearing banks externally. The EPoS sales data cannot be processed to give sophisticated feedback to the merchandising and marketing systems. The lack of integrated operational systems also inhibits longer term planning and the development of the systems that are associated with strategic (long term) planning and that require consolidated data for activities such as forecasting, identifying new sites for expansion, and refining the merchandising activities.

Prerequisites for the next phase of development are -

a. the operational systems either have to be integrated by connecting them together in some way, or a new integrated system needs to be purchased and implemented throughout the organisation,

b. the communication systems throughout the organisation have to be effective,

c. control systems throughout the organisations have to be effective,

d. performance measurement systems have to kept in line with corporate plans,

e. there has to be a technology strategy to ensure that subsequent technological developments are co-ordinated.

During the *systematic phase* of development the food multiple moves towards national operation. This may not literally mean nationally in the sense of total geographic coverage in the UK, but would imply that a significant area of the UK is serviced by the trader - usually understood to be the majority of England, Wales and the densely inhabited parts of Scotland. In this phase the multiple food retailer faces a market that has reached saturation with a few well controlled and managed competitors. The greatest marketing change between this stage and the previous stage is that of focus. Regional operators usually compete on the basis of price, a limited number of product lines (circa 10,000) and a fairly static formula of trading. National operators usually compete on the basis of customer focus and a format of trading that can be quickly tuned to the changing buying behaviour of their target socio-economic group - a mode of competition that can only be achieved with sophisticated information systems.

Within the national food multiple the whole of the organisation becomes systematised and control of everyday activities is almost entirely by computer based information systems. Exceptions to the norm are dealt with manually. If it has not already happened, then the merchandising systems are also automated, although the 'creative' aspects may not. The operational strategies that have been successful in previous phases are augmented by new operational strategies that are based on more sophisticated data about the market and the customer. Customer care and communications operational strategies, that require customer behaviour and buying pattern information, are grafted into the operations strategy structure. Market saturation shifts the focus of senior management towards diversification and/or exploiting overseas opportunities and/or buying competitors. The role of middle and store management is mostly dealing with day to day exceptions and problems highlighted by the control system. Although it may have begun in the previous phase, the system's boundaries become increasingly blurred as they interacts extensively with other automated external systems (e.g. banking and suppliers). Standardisation of these links and systems allows aspects (e.g. distribution) of the system to be subcontracted without loss of control.

As the control system increases in sophistication expert software systems refine the system responses. The enhanced information supplied by the advanced systems allow management to make better decisions. Towards the end of this phase more sophisticated marketing strategies (e.g. relationship marketing) that are based on detailed analysis of EPoS data can be implemented. This greatly increases the effectiveness of the overall organisation allowing a more proactive management style to be adopted. The previously mentioned efficiencies of scale are likely to trigger a great deal of building activity. The old tenets of previous phases have to be replaced with new tenets that are custom built to get the benefits of the integrated systems. Wherever possible old premises are refurbished. These building activities may also require additional capital to be sought from external investors. Investment in the system and infrastructure are likely to take a long time to complete as the implementation of the changes have to be made in hundreds of stores.

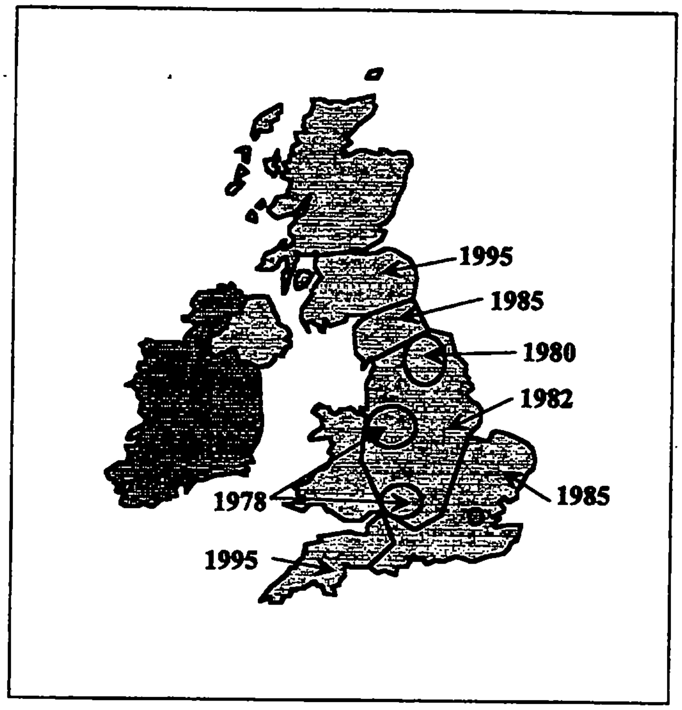
At the end of the systematic phase of development the food multiple will employ in excess of 2,000 FTE's, have more than 100 large stores (>25,000 sq. ft.), and be turning over around £250m to £500m. Expansion is increasingly a problems due to the lack of large sites on which to build stores and the cost of the sites when they do become available. Management's ability to respond quickly to market changes becomes increasingly dominated by the flexibility and boundaries of the systems that run the operations. New opportunities are as likely to come from internal systems driven analyses as from external market changes. Expansion abroad, usually a real option at this stage of the organisations development, may be constrained by systems as much as anything else.

The fifth phase of retail development is *the restructuring phase*. During this phase of evolution the organisation's boundaries become increasing blurred as non value adding functions, distribution for example, are sub-contracted. The organisation, whose focus during the bureaucratic and systematic phases of evolution was on internal processes and efficiency, begins to 'rediscover' the customer through detailed analysis of store trading data. The EPoS data coupled with loyalty card data gives the retailer accurate feedback about customer buying behaviour for the first time. With this data the overall system can now be optimised at the store level and also the implementation of just-in-time supply strategies become possible. As has already been demonstrated in Chapter 4 the internal information system hardware and software become highly sophisticated and automatically manage many of the operational functions of the organisation.

With the main food retailing market stagnating the ever present need for growth can only be satisfied through expansion or co-operation in overseas markets, new trading formats, or diversification into adjacent sectors of the home market. Sainsbury, Tesco and Safeway are all actively looking for opportunities in each of these areas. In the home market sector in which they operate they all have broadly similar product ranges, prices, organisations and trading systems. None of the organisations can easily trade up or down market because their infrastructure is defined by the technology they use and the trading profile they have. They have optimised their systems on the trading profile of the upper quartile market they operate in. To operate in another market sector would require major restructuring that may be prohibitively expensive and unacceptably disruptive. Providing they keep their market share they can trade profitably. The greatest danger of this situation is a price war on a broad front, but this would be difficult to sustain for long enough to bring a competitor to their knees; also the buying behaviour of customers in this sector is very conservative with customer loyalty high. The tactics that Sainsbury, Tesco and Safeway have adopted is to compete on price on a limited range of produce (e.g. in 1997 Tesco claim that they have the lowest price on a range of 600 products - and if a customer can find the same product cheaper they will refund twice the difference). When this kind of price competition is entered into the range of products is very limited (i.e. up to 1000 products in a 25000 product portfolio) and often includes own brand produce to reduces the range of 'comparative' discounted produce. These market dynamics, coupled with market stagnation, are likely to lead to long term price erosion and decreasing profit margins. This helps to explain the continued search for efficiency and effectiveness within the organisations as this is the only way to reduce costs and maintain margins. This becomes the focus for the operational management of the business.

The problems that the food multiples have in this phase of their development are mostly based in the area of strategy. By the time that the multiples have reached the restructuring phase the management structure will have evolved into two levels - the operational level (discussed above) and the strategic level. While the operational management's focus is on efficiency and effectiveness, the strategic management's focus is increasingly on external activities and opportunities. At this stage of evolution the organisations are large and influential. They may have over 300 superstores, employ around 6,000 to 8,000 people and be turning over in excess of £1,000m and this is a position that has to be defended. This defence must, in the first instance, be directed towards the other large multiples in the market through customer retention strategies and initiatives, and in the second instance be directed towards the incursions of foreign competitors. If not actually instigating new trading format development the directors of the multiples have to be closely in touch with the way in which these things are developing. There is a real problem in finding new trading options or distinctive competences, and most initiatives if they hold any prospect of success are quickly copied by competitors. Good examples of this in recent times have been the customer loyalty card and in-store banking. Another problem associated with size is that the organisations begin to attract political and press attention. A great deal of energy, both strategic and tactical, has to be focused on ensuring the public image and policies of the organisation are kept in line with currently accepted ethical standards.

The previously described five phases of evolution are typical of the food retail organisations that begin as the result of a single entrepreneur. Safeway, although having clear entrepreneurial influences in its early development, grew in a very different way.




Source: Company Reports and Accounts

*Figure 5.3 The growth of Safeway (previously the Argyll Group) 1978 - 1995*

The nucleus of control was a small entrepreneurial team who engineered growth through amalgamation and acquisition (described in Appendix 2). Unlike Sainsbury and Tesco who grew in a 'ripple-out mode from London (Figure 5.2), Safeway grew from the regions into London (Figure 5.3). Safeway's early acquisition (and disposals) began with organisations that were in trouble and who were in the early bureaucratic or full bureaucratic phase of development. Later, the leveraged acquisition of Safeway enabled them to move quickly to achieve something approaching national coverage, and having been through the systematic phase are now, along with Sainsbury and Tesco, in the restructuring phase of their evolution. Given the relative scarcity of land for building stores and the current static growth of the UK retail market, this or similar patterns of evolution may become a more normal pattern in the future.

Throughout these phases of evolution technology has played an increasingly important role for the operations management, and more recently of strategic management of the food multiples. As technology has improved so it has been able to provide better control information for operational management leading to improved efficiency. For strategic management the technology has begun to deliver knowledge rather than simply information, and this has proved to be vital in the long term planning of the enterprise. This relationship is worthwhile exploring in a little more detail as it has a direct bearing on this research. A chronological comparison of Sainsbury, Tesco and Safeway allows Table 5.2 to be constructed. This table gives some valuable insights into the way in which technology has affected the management in, and of, these organisations. Clearly the time divisions do not correspond exactly to the previously described stage of food multiple development. Sainsbury's for instance had established a full bureaucratic manual control system by the late 1800s and Tesco had a similar system by the 1940s. However, the time intervals are of relevance when contextualising the impact of emerging technologies, in particular information technology. It should be noted that the percentages used in this table are approximate and based on comments made during interviews with the sources identified at the bottom of the table.

With reference to Table 5.2 the role of technology in management decision making has changed quite radically since 1950. Prior to 1950 the technology used by the Sainsbury and Tesco was associated with basic shop and head office operational functions - registering transactions, preparing reports and monitoring events that occurred in the store and distribution chain. In practical terms this data was available in a useful form quite some time after the operational events had occurred due to manual information

| Factor | By 1950 | By 1980 | By 1990 |
|---|---|---|---|
| Role of technology in ops. management decision making | Passive - 100%<br>Active - 0% | Passive - 50%<br>Active - 50% | Passive - 20%<br>Active - 80% |
| The changing technological balance | Mechanical - 80%<br>Electromech - 20% | Mech. - 10%<br>Electromech. - 10%<br>Electronic - 20%<br>Computer - 60% | Mech. - 5%<br>Electromech. -5%<br>Electronic - 10%<br>Computer - 80% |
| Communication methods between retailer and the supply chain | Written - 80%<br>Telephone - 20% | Written - 60%<br>Telephone - 30%<br>Computer - 10% | Written - 30%<br>Telephone/Fax 30%<br>Computer - 40% |
| Communication between Head Office and stores | Manually prep'd rep's - 60%<br>Visits and telephone - 40% | Manually prep'd rep's - 20%<br>Computer rep's - 50%<br>Visits & telephone - 30% | Computer on-line rep's - 80%<br>Visits & telephone - 20% |
| Technological impact | Store - 40%<br>Distribution - 30%<br>Head Off. - 30% | Store - 20%<br>Distribution - 40%<br>Head Off. - 40% | Store - 20%<br>Distribution - 30%<br>Head Off. - 50% |
| Operational management's understanding of technology | High | Medium | Low |
| Importance of technology to trading and ops control | Low | Medium | High |
| Operational management influence on technological development | High - Medium | Medium - Low | Low |
| Rel'tive influence of technology on ops management of organisation | Low | Medium | High |
| Management style of Ops. Managers | Autocratic - 100% | Autocratic - 90%<br>Democratic - 10% | Autocratic - 80%<br>Democratic 20% |
| Management Style of Technical Managers | n/a | Autocratic - 70%<br>Democratic - 30% | Autocratic - 50%<br>Democratic - 50% |

(Sources: Montagnon, 1993b; Winch, 1993; Randle, 1996; Harris, 1997)

**Table 5.2 Developing technology-management relationships**

processing and as such could only be used in building an historical view of the organisations activities. By 1980 functional control systems had been computerised and integrated. This speeded up the information flow considerably. Prior to 1950 management control information for the operational aspects of the organisation was available on a monthly or weekly basis, by 1980 the same information was available on a weekly or daily basis. This greatly enhanced the efficiency of the management process and the net overall effect of the speeding up of control data was to reduce the amount of stock in the supply chain and to improve the management of individual store performance. These improvements greatly enhanced management's confidence in the technology and systems they were using, and further systems enhancements only served to increase this confidence.

The period between 1980 and 1990 saw a major change in operations management use of technology in their decision making processes. The focus for technological development was almost entirely centred on internal operational functions. During the 1980s this focus shifted to external links. EPoS, a major internal innovation, proved to be the technology that unlocked more effective merchandising, but more importantly, along with EDI, it was also the key to automating the supply chain. These improvements reduced inventory, speeded up the supply systems and improved general operational control. The control of money management was also greatly improved as the EPoS systems were linked to the banking systems to form the EFTPoS system. Overall, the internal information systems became faster and more flexible and the communication systems became more extensive and sophisticated. These trends continued into the 1990s but as the quality of the data improved and the analysis became less operationally oriented the technology began to dominate the wider management information system, and consequently much of strategic management thinking.

This shift in the nature of the information system from manual to computer was primarily due to the changing balance of the technology itself. Table 5.2 clearly shows that almost as soon as the computer based systems became available they were quickly assimilated into the fabric of the companies. By 1997 the computer systems dominated the technological balance in the food retailers and accounted for a significant percentage of their investment. This pattern of increasing dominance is repeated in the main routes of communications within the food multiples - between Head Office and supply chain, and between Head Office and the stores.

The pattern of impact of the technology varied quite considerably and was closely associated with the evolutionary need of the organisation at different times. Technology in the stores had the biggest impact up to 1950 as operational efficiency dominated management thinking. The 1950s boom created a demand that was difficult to satisfy. The stores and the distribution system were under great pressure. By 1980 the emphasis had moved to the distribution systems as the food multiples began to strategically move from distributing all of their produce themselves to sub-contracting a substantial proportion of these activities. By 1990 the impact of technology was most keenly felt at Head Office as systems integration began to move technology into the areas of strategic decision making, and many of the manual decision making activities were automated through the use of expert systems. This process continued throughout the 1990s as technology became more focused on marketing activities and even more influential on the strategic aspects of the organisation.

The lower six aspects of the table give some interesting insights into changing operational management attitudes. It is clear from this table, and from the previous discussion relating to the phase development of the food multiples, that technology was playing an ever more important role in the trading and operations. The evidence of the interviewees suggested that non-technical operations management became increasingly remote from the development of the systems (usually a Head Office activity), while at the same time being increasingly told what to do by the control systems - a situation that has led to some operational managers to develop a suspicion and resentment of the information and control systems. Informal discussions with store managers (see methodology) would tend to support this point of view. The final two parts of the table show the ways in which the management styles of the operational and technical management have changed. The operations managers whose management style is greatly influenced by the Head Office culture have slowly become less autocratic although it is still the dominant style. The technical management whose management style is influenced more by the technical environment and the need to work with technical experts is dominated by a democratic perspective. These differences do help to explain some of the tensions that exist between the operational and technical management.

### *5.7 Change relationships*

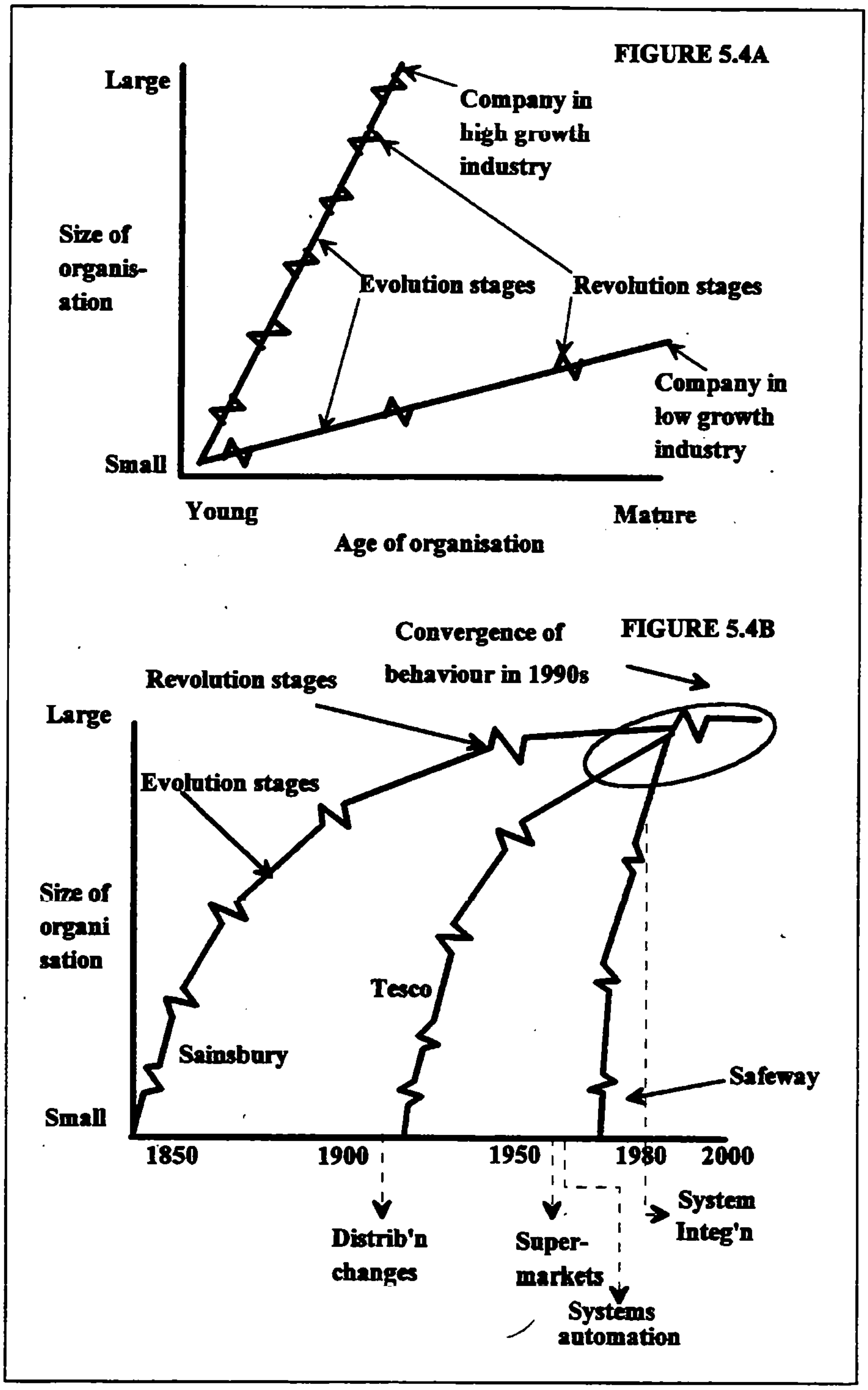
The previously described patterns of evolution of the food multiples of growth followed by a crisis of some description, realignment and reorganisation, and then another growth period before the next crisis occurs - is predicted by Griener (1972), Mintzberg (1967) and Johnson and Scholes (1989). Griener argued that as organisations grow they have periods of evolution followed by short period of revolution, and that the periodicity of the revolutionary aspects is determined by the growth rate of the industry (these relationships are described in Figure 5.4A). He further suggested that the periods of revolution were often precipitated by internal crises (e.g. leadership problems, autonomy problems, control problems, red tape problems, etc.). The patterns of change that have been observed in this research broadly agree with Griener's predictions of corporate behaviour in that the food multiple patterns of growth have typically been a period of stability (or consolidation) followed by a short period of significant change. *However, this research has also demonstrated that in the case of the food multiples, technology has been an important factor in organisational changes and realignments - a factor not highlighted in Griener's analysis.* Figure 5.4B describes the broad patterns of change that the food multiples studied have undergone and how the three food multiples have converged in change terms as time has passed. Within the context of the food multiple market there are four observations in this research that suggest that Griener's theory may need to be modified:

*a. the first is that organisational growth is unlikely to be linear and periods of evolution and revolution may be less predictable than he suggests;*

*b. the second is that as a market becomes saturated and dominated by a few large organisations, the organisations periods of change and stability become closely linked;*

*c. the third is that as organisations become larger technology plays a greater role in improving organisational efficiency, changes to technology are as likely as anything else to trigger periods of 'revolution';*

*d. the fourth is that change is as likely to be triggered by external factors (e.g. market factors) as internal factors.*




(Source: Adapted from Griener, 1972)

**Figure 5.4 Griener growth relationships**

In a similar vein to Griener, Mintzberg's (1978) study of many organisations over several decades suggested that organisations displayed four fundamental change strategies -

1. periods of *stability* in which few or no strategy changes took place,
2. periods of *incremental strategic change* (most typical) in which organisations changed slowly to reflect market changes,
3. periods of *flux* in which organisations changed strategy but in no clear direction, and
4. periods of *transformational change* in which the whole organisation strategy focused on creating a new operational paradigm to meet new market conditions.

Whereas Mintzberg believed that the majority of strategies were driven by the market, Johnson and Scholes suggested that strategy responded to the whole organisational environment rather than simply the market place, and that strategy must be understood in a pluralistic framework that includes the social systems of the organisation, the power relationships in the organisations and the management teams interpretation of past activities and events both within and without the organisation. They argued that even in periods of stability incremental changes to strategy will be taking place to compensate for strategic drift (i.e. a move away from declared strategic or market targets), and as a consequence there are probably only three strategy states - incremental change, a flux state and a transformational state. The evidence of this research clearly identifies at least two of these strategy states at different times in corporate development. The absence of static periods in which no strategy changes are in evidence confirms Johnson and Scholes ideas. There is little evidence to show that food multiples have been through periods of flux in the past. For the most parts market objectives have been clear and focused mostly on growth and efficiency. There have however been periods of transformational change -

the change to the supermarket format during the 1950s, the integration of systems during the 1980s and the current search for new trading formats - and in the latter two changes the role of technology has been of great importance (Figure 5.4B). The influence of technology may of course be seen as extraordinary in the context of the food multiples, but it is more likely that previous general concepts of strategy have not fully explored the changing influence of technology on strategy in recent years (especially in large organisations), and this is an area that needs further research. Certainly the strategic interplay of merchandising, customer service, customer communications and trading style proposed by Waters (1988) [Figure 2.5], is now dominated by information made available by the systems technology.

### *5.8 Conclusions*

The histories of the three retailers contained in Appendix 2 and discussed in this chapter allow three fundamental observations. The first is that to be a major player in the food retailing market it is necessary in the first instance to have a clear understanding of the market characteristics and customer needs. This understanding is a focus for the business and with this understanding food retail operations can be designed and adapted to service customer needs and secure a market niche. Secondly, it is vital to view operational efficiency as a core competence supporting all aspects of the organisation - distribution, customer care, merchandising and customer communications. In a low gross margin business operational efficiency protects net margins and information technology prevent operational strategies becoming unsynchronised and dysfunctional. The third observation is that growth, and ultimately size, constantly challenges management's ability to control the organisation. The key to maintaining operational control is an effective performance measurement system. Monitoring and feedback systems are vital to this task and it is the information technology that allows this feedback to be gathered and processed quickly.

The relationship between the size of a food retail organisation and the information technology it uses appears to be proportional. The larger the organisation the more information technology it uses and in a wider variety of applications. This is certainly the case today, it has not always been the case in the past when only manual systems were available. However, to compare a food multiple today with one in the 1850s is not comparing like with like. Comparisons can be misleading. In information technology terms there is a clear case to be argued that it is, and has been, a vital element in maintaining operational efficiency and control. As such it will also play a vital role in operational strategies. Whether or not in performing this task information and control systems are shaping general food retailer strategies is a broader issue.

The patterns of growth, technological and corporate change that have been observed in the food multiples are not unique. Similar patterns may be found in manufacturing organisations where both Hill (1993) and Schonberger (1987) who cite several examples that closely parallel the nature and pattern of change observed in the food multiples. In practice the difficulty in the real world is to identify how strategy is affecting tactics. The food multiples all have declared strategies of 'growth' and 'efficiency'. The reality of trading in any market where there is competition is that both of these are economic necessities rather than strategies. If growth and efficiency were strategies, then all management activities could be regarded as tactics and as enabling the basic strategic objectives. This may be the reason that technological changes have historically been regarded as 'enabling' rather than 'leading' strategy. To make this statement today is a mistake. Prior to 1980 the food multiple strategies tended to be dominated by physical considerations (e.g. the move to the larger store formats, creating and developing the distribution network). During the 1980s it was the information technology that increasingly defined the food multiples boundaries of operations, the tactics that they employed and the direction they took in the market place. By defining the boundary of operations, is technology defining strategy or tactics? The answer to this question really depends upon how strategy is defined. If strategy is defined as long term planning and the domain of visionary leaders (i.e. in the unitary tradition described by Chandler, Ansoff, and Sloan) then *technology, no matter how sophisticated, is not a strategic but an operational tool - no more.* If, however, strategy is defined in the pluralistic tradition (Mintzberg, Johnson and Scholes, et al) then *technology, in providing information for management decisions of all types, can be regarded as a major shaper of corporate culture and the organisations response to customers and the environment. As such information technology has a significant influence on strategy.* This is especially the case when it takes on many of the managerial functions as is the case in the food multiples. Managers and directors use the information supplied by technology to evaluate their own activities and those of their competitors. The information they have collected via EPoS provides the basis for nearly all marketing and merchandising activities. And, it is the information that the technology processes and interprets that identifies new strategic opportunities in the future. *In identifying and clarifying these relationships in the case of the food retail multiples this research demonstrates that there is a convincing argument to show that the influence of information technology on corporate culture is not passive but active. In this role technology will help to shape both tactics and strategy.*

# Chapter 6

# Performance Measurement, Emergent Operational Strategies and Core Competences

## 6.1 Introduction

In Chapter 5 the five phases of food multiple development were identified and explored in the context of the market, tactical challenges and organisational strategic focus. These same five phases will now be used to examine the evolution of the performance measurement systems (PMS), and the operational strategies in the food multiples. By examining the PMS in the store, in the distribution system and at Head Office, it will be possible to demonstrate the importance of developing the information systems as a core competence to support other corporate development. The examination of the emergent operational strategies and core competences will allow a functional model of the food multiple to be developed, and through this a better appreciation of the role of the information system as the dominant technology in the dynamics of the organisation.

## 6.2 The evolution of the performance measurement systems

Performance measurement (PM) in the modern food multiple is a well developed management discipline. The research identified 35 PM's applied at the store level, 33 PM's in the depot and distribution system, and 31 PM's at Head Office. These lists are not exhaustive as the whole system of PM is constantly under review as the environment changes and the food multiples develop. Also, the description of the historic development of the PM's was very much a matter of memory, and few of the interviewees could remember exactly which PM's were used and when. Within these constraints the following analysis has been undertaken.

The PMS have been analysed using a standard layout that has been applied to the store (Table 6.1), the depot (Table 6.2) and the Head Office (Table 6.3). Column 1 identifies the main functions that the PM's are associated with. Column 2 contains a description of the main activities undertaken by those functions in the organisation. Column 3 lists the main PM's that are available in the modern (Phase 5) system and the frequency of the report. It is these PM's that the functional managers will be judged, and will judge their own performance and that part of the organisation they are responsible. Columns 4, 5 and 6 describe the main method of inputting data into the PMS; the main way in which the performance data is processed and made available for control purposes; and the final of these three columns where the performance report is delivered. Columns 7 and 8 indicate whether or not the report is automatically generated, or alternative if the report is delivered on request. In some instances the report may be automatically generated for some of the management (e.g. store management) and be available on request for other managers (e.g. general management). In general the reports that are delivered on a daily or weekly basis are operational and trading reports, the other reports tend to be focused on ancillary or secondary activities. The final four columns of data indicate whether or not the performance measure was available or used during a particular phase of the food multiple development (Phases 1 to 4). It should be noted that these four columns have been evaluated at the end of the phase in question. In practice they would change considerably throughout the phase and an individual PM may begin a phase with manual input and manual output but end it with manual input and automatic output due to information system enhancements.

## Table 6.1 : Store Functions, Descriptions and Performance Measurement Analysis

Source: Dove, TEXB02.95 &TEB03.06/95; Baker, JBCH2.01.94 & JBCH3.02.94; Knee & Walters, 1985; Walters, 1988; Report structures of IBM, ICL & Siemens retail systems

| Function | Description of Activities | Performance Measurements | Phase 5 Data Activities: Data Input | Phase 5 Data Activities: Data Output | Phase 5 Data Activities: Destination | Auto Report | Call-off Report | Available During: Phase 1 | Available During: Phase 2 | Available During: Phase 3 | Available During: Phase 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Cash Management: | Daily/hourly cash, credit & debit | Daily cash reconcilliation | Computer | Computer | H.O. | ☆ | | M/M | M/C | C/C | C/C |
| | collection and safe storage in store | Daily credit reconcilliation | Computer | Computer | H.O. | ☆ | | M/M | M/C | C/C | C/C |
| | Cash handling to & from bank | Daily debit reconcilliation | Computer | Computer | H.O. | ☆ | | M/M | M/C | C/C | C/C |
| | Wages & expenses | Individual expense monitoring | Manual | Computer | Store/H.O. | | ☆ | N | M/C | M/C | M/C |
| | Security services | Store running expense monitoring | Manual | Computer | Store/H.O. | ☆ | | N | M/C | M/C | M/C |
| | | Wage monitoring | Computer | Computer | Store/H.O. | ☆ | | N | M/C | M/C | C/C |
| Inventory Management: | Unloading deliveries & BOS storage | Order - delivery reconcilliation (daily) | Computer | Computer | Store/H.O. | ☆ | | M/M | M/C | M/C | C/C |
| | Shelf replenishment & EPoS usage data | Stock shortage reporting (daily) | Computer | Computer | Store/H.O. | ☆ | | M/M | M/C | M/C | C/C |
| | OOD Stock removal & disposal | Overstock reporting (daily) | Computer | Computer | Store/H.O. | ☆ | | M/M | M/C | M/C | C/C |
| | Damaged stock recording | Return stock reporting (daily) | Computer | Computer | Store/H.O. | ☆ | | M/M | M/C | M/C | C/C |
| | Waste stock recording | Stock audit information (monthly) | Computer | Computer | Store/H.O. | ☆ | | M/M | M/C | M/C | C/C |
| | Shelf destocking | OOD Stock reporting (daily) | Computer | Computer | Store/H.O. | ☆ | | M/M | M/C | M/C | C/C |
| | Return stock control | Waste stock reporting (monthly) | Computer | Computer | Store/H.O. | ☆ | | M/M | M/C | M/C | C/C |
| Merchandising | Pricing | Product performance (weekly) | Computer | Computer | H.O. | | ☆ | M/M | M/C | C/C | C/C |
| | Quality | Product quality (weekly/monthly) | Computer | Computer | Store/H.O. | | ☆ | M/M | M/M | C/C | C/C |
| | Product mix | Income per product (daily/weekly) | Computer | Automate | Store/H.O. | | ☆ | N | M/M | C/C | C/C |
| | Promotions & offers | Income per square metre (weekly/monthly) | Computer | Computer | Store/H.O. | ☆ | | M/M | M/M | C/C | C/C |
| | Shelf & gondola layout | Income per special trading area (e.g. bakery) | Computer | Computer | Store/H.O. | ☆ | | N | N | C/C | C/C |
| | New product launch | Basket size | Computer | Computer | H.O. | | ☆ | N | N | F | C/C |
| | Space management | Basket analysis | Computer | Computer | H.O. | | ☆ | N | N | F | C/C |
| | Special demonstrations | | | | | | | | | | |
| Trading format: | Exterior design | Breakdown reports building fabric (weekly) | Manual | Computer | Store/H.O. | | ☆ | P | M/M | M/C | M/C |
| | Interior design | Breakdown reports info. systems (daily) | Computer/Man | Computer | Store/H.O. | | ☆ | P | M/M | M/C | M/C |
| | Location | Breakdown reports gen services (weekly) | Manual | Computer | Store/H.O. | | ☆ | P | P | M/C | M/C |
| | Layout | Trading equipt. maint. rep's (weekly/monthly) | Manual | Computer | Store/H.O. | | ☆ | P | P | M/C | M/C |
| | Access, parking & roads | | | | | | | | | | |
| | Trolleys | | | | | | | | | | |
| Personnel | Employment condition & wages | Hours worked (weekly) | Computer | Computer | Store/H.O. | ☆ | | M/M | M/C | M/C | C/C |
| | Scheduling | Training courses per person (quarterly/annual) | Manual | Manual | Store/H.O. | | ☆ | P | M/M | M/M | M/M |
| | Product training | Performance appraisal (quarterly) | Manual | Manual | Store/H.O. | | ☆ | P | M/M | M/M | M/M |
| | Recruitment | Absenteeism (weekly) | Manual | Manual | Store/H.O. | ☆ | | M/M | M/M | M/M | M/M |
| | Performance appraisal | Loyalty (annual) | Manual | Manual | Store/H.O. | | ☆ | P | P | M/M | M/M |
| | Management training | Check-out accuracy (monthly) | Computer | Computer | Store/H.O. | ☆ | | P | P | M/C | C/C |
| Customer service | Complaints book | Queue length (continuous) | Computer | Computer | Store | ☆ | | N | P | C/C | C/C |
| | Customer loyalty cards | Complaints feedback (continuous) | Manual | Manual | Store/H.O. | ☆ | | N | P | M/M | M/M |
| | Comfort services (café, toilets) | Average spend per card transaction (weekly) | Computer | Computer | H.O. | | ☆ | N | P | C/C | C/C |
| | Convenience services (nursery) | Average time in store (monthly) | Computer | Computer | H.O. | | ☆ | N | P | C/C | C/C |
| | Ancillary services (pharmacy) | | | | | | | | | | |
| Customer communications | In-store advertising gen prods | In-store market research (random) | Manual | Manual | H.O. | | ☆ | P | P | M/M | M/M |
| | In-store advertising promotions | | | | | | | | | | |
| | Regional TV advertisement | | | | | | | | | | |
| | Local radio advertisement | | | | | | | | | | |
| | Company magazine | | | | | | | | | | |
| | Free data sheets (menu's etc.) | | | | | | | | | | |
| | Direct advertising to cardholders | | | | | | | | | | |

M/M = Manual Input/Manual Output; M/C = Manual Input/Computer Output; C/C = Computer Input/Computer Output; N=None; P=Possible

n.b Computer input may be via a key board or via automatic data collection device eg. bar code reader

## Table 6.2 : Distribution and Depot Functions, Descriptions and Performance Measurement Analysis

Sources: Dove, TE:JD2:02:95 & TE:JD3:06:95; Baker, JS:CB2:01:94 & JS:CB3:02:94; Knee & Walters, 1985; Walters, 1988; Report structures of IBM, ICL & Siemens retail systems

| Function | Description of Activities | Performance Measurements | Phase 5 Data Activities: Data Input | Data Output | Destination | Auto Report | Call-off Report | Available During: Phase 1 | Phase 2 | Phase 3 | Phase 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Goods In | Unloading lorries & checking delivered stock against order | On-time delivery per supplier (daily) | Computer | Computer | H.O./Suppl'r | ☆ | | P | P | M/C | C/C |
| | Updating order status | Shortages per supplier (daily) | Computer | Computer | Depot/H.O./Supp. | ☆ | | M/M | M/M | C/C | C/C |
| | Stock movements to temperature regions of inwards stock holding | Damage or spoilage during transport per supplier (daily) | Manual | Computer | H.O./Supplier | ☆ | | M/M | M/M | M/C | C/C |
| Depot Inventory Management | Moving stock to storage area/bin | Percent correct placing (audit) [rolling] | Computer | Computer | Depot/H.O. | ☆ | | N | M/M | M/C | M/C |
| | Moving stock to holding area if it is to be delivered to stores immediately | Percent correct retrieval (sample) [rolling] | Computer | Computer | Depot/H.O. | ☆ | | P | M/M | M/C | C/C |
| | Picking for store deliveries | Picking rate per operator (calculated) [rolling] | Computer | Computer | Depot | ☆ | | N | N | C/C | C/C |
| | Packing in stillages ready for delivery | Percent correct pick per operator (sample) [variable] | Computer | Computer | Depot | | ☆ | N | N | M/C | C/C |
| | Loading lorries in delivery order | Percent correct pick per delivery stillage (sample) [variable] | Computer | Computer | Depot/Store | | ☆ | P | P | M/M | M/C |
| | Auditing activities | Percent orders despatched on time [daily] | Manual | Computer | Depot/H.O. | ☆ | | P | P | M/C | M/C |
| | | Bar code errors (daily) | Computer | Computer | Depot/H.O. | | ☆ | N | P | M/C | C/C |
| Order Processing Management | Delivery/stock order reconciliation | Daily completed stock orders | Computer | Computer | Depot/H.O. | ☆ | | M/M | M/C | C/C | C/C |
| | Shortage/breakage notification to supplier and to Head Office | Incomplete stock order analysis (daily) | Computer | Computer | Depot/H.O. | ☆ | | M/M | M/C | C/C | C/C |
| | Completed stock orders notification to Head Office | Daily completed store orders | Computer | Computer | Depot/H.O./Store | ☆ | | M/M | M/C | C/C | C/C |
| | Rolling stock audit | Incomplete store order analysis (daily) | Computer | Computer | Depot/H.O./Store | ☆ | | P | P | M/C | C/C |
| | Store order issue to picking | Part order stock analysis (daily) | Computer | Computer | Depot/H.O | ☆ | | N | P | M/C | C/C |
| | Store order notification of despatch | Part order store analysis (daily) | Computer | Computer | Depot/H.O./Store | ☆ | | N | P | M/C | C/C |
| | Store aggregation orders to despatch | | | | | | | | | | |
| Transport Management | Incoming transport scheduling | Transport or operator usage (daily) | Computer | Computer | H.O. | | ☆ | M/M | M/M | M/C | C/C |
| | Incoming transport offloading | Transport reliability statistics (weekly) | Computer | Computer | Depot/H.O. | ☆ | | P | M/M | M/C | C/C |
| | Outgoing store delivery scheduling | Delivery reliability to depot/to store (daily) | Computer | Computer | Depot/H.O./Store | ☆ | | N | P | M/C | M/C |
| | Outgoing store delivery onloading | Lorry loading efficiency (daily) | Computer | Computer | Depot/H.O. | ☆ | | N | N | M/C | C/C |
| | Route planning | Route efficiency (daily/weekly) | Computer | Computer | Depot/H.O. | | ☆ | N | N | C/C | C/C |
| | Transport maintenance scheduling | Maintenance schedule/report (weekly) | Manual | Computer | Depot/H.O. | | ☆ | P | P | M/M | M/C |
| | Transport breakdown & emergency management | Driver training schedule (monthly/quarterly) | Manual | Manual | Depot | | ☆ | N | P | M/M | M/M |
| Building & plant | General building maintenance | Equipment maintenance logs (weekly) | Manual | Manual/Comp | Depot/H.O. | | ☆ | P | M/M | M/C | M/C |
| | Computer storage systems maintenance | Equipment repair logs (weekly) | Manual | Manual/Comp | Depot/H.O. | | ☆ | M/M | M/M | M/C | M/C |
| | Temperature zone refrigeration maint. | Services repair logs (weekly) | Manual | Manual/Comp | Depot/H.O. | | ☆ | M/M | M/M | M/M | M/M |
| | Forklift and internal transport maintenance | Building damage/repair logs (weekly) | Manual | Manual/Comp | Depot/H.O. | | ☆ | M/M | M/M | M/M | M/M |
| Personnel | Employment conditions & wages | Hours worked total/by employee (daily/weekly) | Computer | Computer | Depot/H.O. | ☆ | | M/M | M/C | C/C | C/C |
| | Work scheduling | Training courses per person (quarterly/annually) | Manual | Manual/Comp | Depot/H.O. | | ☆ | N | M/M | M/M | M/C |
| | Skill training & development | Performance appraisal (quarterly/annually) | Manual | Manual/Comp | Depot | | ☆ | P | M/M | M/M | M/C |
| | Recruitment | Absenteeism (daily/weekly) | Manual | Manual/Comp | Depot/H.O. | | ☆ | N | M/M | M/M | M/C |
| | Performance appraisal | Sickness (daily/weekly) | Manual | Manual/Comp | Depot/H.O. | | ☆ | M/M | M/M | M/M | M/C |
| | Management development | Loyalty (annual) | Manual | Computer | Depot/H.O. | | ☆ | N | N | P | M/M |

M/M - Manual input/manual ouput, M/C - Manual input/Computer output, C/C - Computer input/Computer output, N - none, P - possible

n.b. Computer input may be via a key board or via an automatic data collection device e.g. a bar code reader

## Table 6.3 : Head Office Functions, Descriptions and Performance Measurement Analysis

Sources: Dove, TB:JD2:02:95 &TB:JD3:06:95; Baber, JB:CB2:01:94 & JB:CB3:02:94; Knee & Walters, 1985; Walters, 1988; Report structures of IBM, ICL & Siemens retail systems

| Function | Description of Activities | Performance Measurements | Phase 5 Data Activities: Data Input | Data Output | Destination | Auto Report | Call-off Report | Available During: Phase 1 | Phase 2 | Phase 3 | Phase 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Buying functions | Item price monitoring | % Errors in deliveries by supplier (daily/weekly) | Computer | Computer | Funct Man/Gen Man | ☆ | ☆ | N | P | M/C | C/C |
| | Supplier development | % Rejects on delivery bysupplier/carrier (daily/weekly) | Computer | Computer | Funct Man/Gen Man | ☆ | ☆ | M/M | M/C | C/C | C/C |
| | Supplier performance monitoring | % Rejects at store by product/supplier (daily/weekly) | Computer | Computer | Funct Man/Gen Man | ☆ | ☆ | M/M | M/C | C/C | C/C |
| | Supplier contract maintenance | Product quality sampling (daily/weekly) | Computer | Computer | Funct Man/Gen Man | ☆ | ☆ | N | P | M/C | C/C |
| | Quality performance monitoring | Product price monitoring (daily/weekly) | Computer | Computer | Funct Man/Gen Man | ☆ | ☆ | M/M | M/C | C/C | C/C |
| | Competitor buying monitoring | Service performance (daily/weekly) | Computer | Computer | Funct Man/Gen Man | ☆ | ☆ | M/M | M/M | C/C | C/C |
| Selling functions | Store sales - individual/regional/national | Sales vs target by store/region (daily/weekly) | Computer | Computer | Funct Man/Gen Man | ☆ | ☆ | M/M | M/C | C/C | C/C |
| | Store performance | Variance measurement [hours, scrap, t.o. per sq. ft | Computer | Computer | Funct Man/Gen Man | ☆ | ☆ | P | M/M | M/C | C/C |
| | Merchandise performance monitoring | -per person, etc.] (daily/weekly/monthly) | | | | | | | | | |
| | Customer behaviour monitoring | Customer sales analysis [no of trans., range of products | Computer | Computer | Funct Man/Gen Man | ☆ | ☆ | N | N | P | C/C |
| | Product profile/promotion monitoring | seasonal varitiations, etc] (daily/weekly/monthly) | | | | | | | | | |
| | Margin management | Sales/profit per product/section [store/region/national] | Computer | Computer | Funct Man/Gen Man | ☆ | ☆ | N | N | P | C/C |
| | Promotion monitoring | (weekly/monthly) | | | | | | | | | |
| | Competitor sales monitoring | Competitor sales analysis (monthly/yearly) | Manual | Computer | Funct Man/Gen Man | ☆ | ☆ | N | N | P | M/C |
| Product development | New product development | New product introductions (monthly) | Manual | Computer | Funct Man/Gen Man | | ☆ | N | N | P | M/C |
| | Customer evaluation | Repackaging product changes (monthly) | Manual | Computer | Funct Man/Gen Man | | ☆ | N | N | P | M/C |
| | Packaging development | Old product deletions (monthly) | Manual | Computer | Funct Man/Gen Man | | ☆ | N | N | P | M/C |
| | Product performance testing | | | | | | | | | | |
| Replenishment functions | Depot replenishment monitoring | See buying functions for delivery performance | | | | | | | | | |
| | Store replenishment monitoring | to depot and store | | | | | | | | | |
| | Stock turn monitoring store/depot | Stock turn at store (weekly/monthly/annual) | Computer | Computer | Funct Man/Gen Man | ☆ | ☆ | P | M/C | M/C | C/C |
| | Stock planning and forecasting | Stock turn at depot (weekly/monthly/annual) | Computer | Computer | Funct Man/Gen Man | ☆ | ☆ | P | M/C | M/C | C/C |
| | Quick response activities | Product time in delivery chain | Computer | Computer | Funct Man/Gen Man | ☆ | ☆ | N | N | P | M/C |
| Corporate management suite | Cash flow accounting (EFTPoS analysis) | Cash in/out per day | Computer | Computer | Gen Man | ☆ | | M/C | M/C | C/C | C/C |
| | Corporate accounting | Credit transactions per day | Computer | Computer | Gen Man | ☆ | | M/C | M/C | C/C | C/C |
| | Marketing & competitor analysis | Expenses by store/region/total (daily/weekly/monthly) | Computer | Computer | Gen Man | ☆ | | P | M/C | C/C | C/C |
| | Trading data analysis (EPoS analysis) | Cash flow forecast (daily/weekly/monthly) | Manual | Computer | Gen Man | ☆ | | M/C | M/C | C/C | C/C |
| | Company reports & accounts preparation | Customer profile analysis (monthly) | Computer | Computer | Gen Man | | ☆ | N | N | P | C/C |
| | Variance reporting system | Competitor profile analysis (monthly) | Manual | Computer | Gen Man | | ☆ | N | N | P | C/C |
| | Personnel activities | Variance analysis by store/region/national (weekly/monthly) | Computer | Computer | Gen Man | ☆ | | N | P | M/C | C/C |
| | Overseas operations | CMROI analysis (monthly/annually) | Computer | Computer | Gen Man | ☆ | | P | M/C | C/C | C/C |
| | Partnership operations | Gross profit analysis (daily/weekly/monthly) | Computer | Computer | Gen Man | ☆ | | M/C | M/C | C/C | C/C |
| | | Summary sales performance (daily/weekly/monthly) | Computer | Computer | Gen Man | ☆ | | P | M/C | C/C | C/C |
| | | Summary product performance (daily/weekly/monthly) | Computer | Computer | Gen Man | ☆ | | N | P | M/C | C/C |
| | | Personnel summary report (daily/weekly/monthly) | Computer | Computer | Gen Man | ☆ | | N | P | M/C | C/C |
| | | Capital expenditure summary report (weekly/monthly) | Computer | Computer | Gen Man | ☆ | | M/C | M/C | M/C | C/C |
| | | Occupancy summary report (weekly/monthly) | Computer | Computer | Gen Man | ☆ | | M/C | M/C | C/C | C/C |

M/M - Manual input/manual ouput, M/C - Manual input/Computer output, C/C - Computer input/Computer output, N - none, P - possible
n.b. Computer inut may be via a key board or via an automatic data collection device e.g. bar code reader

If Tables 6.1, 6.2 and 6.3 are viewed as a whole clear patterns emerge. Phase 1 developments are dominated by manual system of inputting data to the PMS, manual processing of the data and manually preparing performance reports. This manual activity is expensive and is generally slow to produce output. If a speedy response is required then the only real option is fragment the calculation process and to use a lot of people. For some activities such as cash management or inventory management this is worthwhile as this data is essential for control purposes. For other activities that may be less critical a delay in getting the performance measure may be tolerated. With growth into Phase 2 the dominant way of inputting data is still manual. However, performance output is increasingly being prepared on the basis of computer analysis and computer generated reports. The raw performance data is usually processed on computers that are dedicated to a particular aspect of the system - the inventory control system for example. As phases are progressed through there is a steady migration towards computer input and output. As the information technology becomes integrated during Phase 3 of the food multiple's development, the gaps in the performance measurement matrix quickly fill. By the time Phase 3 has been completed the performance measurement system is almost complete. Where the performance measurement system remains with manual input or output throughout the phases of development the reasons are usually associated with the sporadic nature of the events being measured - individual performance appraisal for example, or because the information can only be gathered manually to give satisfactory results - market research in the stores would be a good example.

The data in Tables 6.1, 6.2 and 6.3 clearly gives some broad idea of the changes that take place and the very wide range of performance measures that are used throughout the modern food multiple. However, more insights are to gained by taking this basic data and presenting it in a slightly different format. This is illustrated in Tables 6.4, 6.5 and 6.6. In these tables the format of the previous three tables has been simplified to 8 columns and re-focused on phase developments in performance measurement. Column 1 contains an identification of the phase the organisation is in. Column 2 identifies the focus for the performance measures during each phase. Column 3 identifies the fastest time that the reporting system can respond. Column 4 shows the balance of manual/automatic input/output, and column 6 the destination of each performance report. Column 7 indicates the extent to which each area of performance measurement is developed in comparison to the full performance measurement range of phase 5. The final column indicates which percentage of the complete performance measurement suite is used during each phase.

Table 6.4 focuses on the performance measurement activities in the store. An examination of column 2 shows that in Phase 1 only three out of the seven foci for performance measurement are being used. These are the core cash flow measures that summarise each stores performance. It is interesting to note that the only 50% of the cash flow suite and 33% of the personnel suite of measures are implemented at this stage, whereas 100% of the inventory control suite are implemented. This would indicate that management are preoccupied with inventory - a fact confirmed by previous analysis that identified getting the right product mix as a key target for Phase 1. Inventory management would also be important in terms the cash tied up in the business. Overall, only 47% of the possible PM's are used in this phase due in part to the unsophisticated systems being used, and in part to the relatively unsophisticated management styles that tend to dominate activities in the organisation during Phase 1.

*Table 6.4 Summarised Store Performance Measurement Analysis*

| Phase | Focus for Perf Meas | Fastest PM Resp Time | Dominant data I/P | Dominant data O/P | Primary/secondary data destination | % of PM's used in this phase per item | % of PM's used in phase overall |
|---|---|---|---|---|---|---|---|
| 1 | Cash flow | 2 days | Manual 100% | Manual 100% | Head Office | 50% | |
| | Inventory | 5 days | Manual 100% | Manual 100% | Head Office | 100% | 43% |
| | Personnel | 1 day | Manual 100% | Manual 100% | Store/Head Office | 33% | |
| 2 | Cash Flow | 2 days | Manual 100% | Computer 100% | Head Office/Store | 100% | |
| | Inventory | 2-3 days | Manual 100% | Computer 100% | Head Office/Store | 100% | |
| | Merchandising | 5-7 days | Manual 100% | Man 75% Comp 25% | Head Office | 57% | 66% |
| | Trading format | 3-5 days | Manual 100% | Manual 100% | Head Office/Store | 50% | |
| | Personnel | 1 day | Manual 100% | Man 75% Comp 25% | Store/Head Office | 66% | |
| 3 | Cash flow | 1 day | Comp 50% Man 50% | Computer 100% | Head Office/Store | 100% | |
| | Inventory | 2 days | Comp 67% Man 33% | Computer 100% | Head Office/Store | 100% | |
| | Merchandising | 1 day | Computer 100% | Computer 100% | Head Office/Store | 71% | |
| | Trading format | 3-5 days | Manual 100% | Computer 100% | Store/Head Office | 100% | 94% |
| | Personnel | 1 day | Manual 100% | Man 75% Comp 25% | Store/Head Office | 100% | |
| | Customer service | 1-3 days | Comp 75% Man 25% | Comp 75% Man 25% | Head Office/Store | 100% | |
| | Customer comm's | 2-5 days | Manual 100% | Manual 100% | Head Office | 100% | |
| 4 | Cash flow | 1 day | Comp 66% Man 33% | Computer 100% | Head Office/Store | 100% | |
| | Inventory | 1 day | Computer 100% | Computer 100% | Head Office/Store | 100% | |
| | Merchandising | 1 day | Computer 100% | Computer 100% | Head Office/Store | 100% | |
| | Trading format | 1-2 days | Manual 100% | Computer 100% | Store/Head Office | 100% | 100% |
| | Personnel | 1 day | Manual 100% | Man 75% Comp 25% | Store/Head Office | 100% | |
| | Customer service | 1-3 days | Comp 75% Man 25% | Comp 75% Man 25% | Head Office/Store | 100% | |
| | Customer comm's | 2-5 days | Manual 100% | Manual 100% | Head Office | 100% | |
| 5 | Cash flow | 1 day | Comp 66% Man 33% | Computer 100% | Head Office/Store | 100% | |
| | Inventory | 1 day | Computer 100% | Computer 100% | Head Office/Store | 100% | |
| | Merchandising | 1 day | Computer 100% | Computer 100% | Head Office/Store | 100% | |
| | Trading format | 1-2 days | Man 75% Comp 25% | Computer 100% | Store/Head Office | 100% | 100% |
| | Personnel | 1 day | Manual 100% | Man 75% Comp 25% | Store/Head Office | 100% | |
| | Customer service | 1-3 days | Comp 75% Man 25% | Comp 75% Man 25% | Head Office/Store | 100% | |
| | Customer comm's | 2-5 days | Manual 100% | Manual 100% | Head Office | 100% | |

By Phase 2 'Trading Format' and 'Merchandising' have been added to the performance measure portfolio. As with the PM's of Phase 1 these new additions are initially implemented at a basic level and generate information that is required for the control of the expanding number of products and stores. The evolution of the merchandising PM's in particular are important as product mix is much more critical as the food retailer makes the transition to Phase 3 and a much wider operating base. The product mix is also very important in determining the market image of the organisation and in exploiting the market platform that emerges from the trading experiments of Phase 1. During this phase the cash flow PM's are fully implemented, 57% of the merchandising PM's and 50% of the trading format PM's are implemented, and the personnel PM's implementation is raised to 66%. Overall the number of the potential PM's that could be used has risen to 66% of the total. The increasing number of personnel PM's reflects the growing size of the organisation and the need to control a quickly growing expense. The control focus is still very much at Head Office and this is illustrated by the number of reports whose primary focus is the Head Office. Using computers speeds up the availability of control data, and while the stores themselves may remain relatively unsophisticated in terms of data collection, the same is not true of the Head Office functions whose head count costs are reduced and response time improved by using computers.

By the end of Phase 3 the food multiple has almost completed the PM portfolio with 94% of all PM's being implemented. Computer based data collection has replaced much of the manual data collection of Phase 2. If it has not already been installed towards the end of Phase 2, EPoS will be implemented during this phase. EPoS greatly improves check-out productivity and provides the stock usage data for more efficient stock ordering. The general move towards computer based information processing improves the overall response time of the PM system with many individual report times falling by a half.

From the point of view of the Store Managers the improvement in the range of PM's and the speed of the feedback is invaluable. Prior to Phase 3 improvements the manager had a limited view of what was actually happening in the key areas of the store operations. To get better information means either waiting for reports or undertaking manual investigations. This could lead to poor operational decisions and waste or inefficiency. Stock related problems in particular, with perhaps 10,000 to 15,000 product lines, are difficult to address without the availability of a timely and reasonably accurate stock list. At the store level the management are operating in real time and this means that there is a constant pressure to speed up the response of the Head Office PM reporting system. This inevitably leads to pressure for information system integration at Head Office and further automation of input to the PM system in the store.

An examination of Phases 4 and 5 in Table 6.4 shows that aside from some marginal increases in speed of response gained from system integration and additional computerisation, there is little difference between these two phases as far as the store PMS is concerned. This is to be expected as the emphasis on information system development has shifted from the operational aspects of the organisation to the corporate and strategic aspects. It would be incorrect to suggest that this is the end of PM development in the stores, because the concepts and structures of the PMS are always being developed.

*Table 6.5 Summarised Distribution & Depot Performance Measurement Analysis*

| Phase | Focus for Perf Meas | Fastest FM Resp Time | Dominant data I/P | Dominant data O/P | Primary/secondary data destination | % of FM's used in this phase per item | % of FM's used in phase overall |
|---|---|---|---|---|---|---|---|
| 1 | Goods In | 2 days | Manual 100% | Manual 100% | Head Off/Supp'r/Dep | 67% | |
| | Order Processing | 2 days | Manual 100% | Manual 100% | Depot/Head Office | 50% | |
| | Transport man. | 2-5 days | Manual 100% | Manual 100% | Depot/Head Office | 14% | 33% |
| | Building & plant | 5days | Manual 100% | Manual 100% | Depot/Head Office | 75% | |
| | Personnel | 2 days | Manual 100% | Manual 100% | Depot/Head Office | 33% | |
| 2 | Goods In | 2 days | Manual 100% | Manual 100% | Head Off/Supp'r/Dep | 67% | |
| | Dep Inventory man. | 2-5 days | Manual 100% | Manual 100% | Depot/Head Office | 29% | |
| | Order Processing | 2 days | Manual 100% | Computer 100% | Depot/Head Office | 50% | |
| | Transport man. | 2-5 days | Manual 100% | Manual 100% | Depot/Head Office | 29% | 54% |
| | Building & plant | 3-5 days | Manual 100% | Manual 100% | Depot/Head Office | 100% | |
| | Personnel | 1-2 days | Manual 100% | Man 80% Comp 20% | Depot/Head Office | 83% | |
| 3 | Goods In | 1-2 days | Man 67% Comp 33% | Computer 100% | Head Off/Supp'r/Dep | 100% | |
| | Dep Inventory man. | 1-2 days | Man 85% Comp 15% | Comp 85% Man 15% | Depot/Head Office | 100% | |
| | Order Processing | 1-2 days | Man 50% Comp 50% | Computer 100% | Depot/Head Office | 100% | |
| | Transport man. | 2-3 days | Man 85% Comp 15% | Man 71% Comp 29% | Depot/Head Office | 100% | 97% |
| | Building & plant | 2-3 days | Manual 100% | Man 50% Comp 50% | Depot/Head Office | 100% | |
| | Personnel | 1-2 days | Man 80% Comp 20% | Man 80% Comp 20% | Depot/Head Office | 83% | |
| 4 | Goods In | 1 day | Computer 100% | Computer 100% | Head Off/Supp'r/Dep | 100% | |
| | Dep Inventory man. | 1 day | Comp 58% Man 42% | Computer 100% | Depot/Head Office | 100% | |
| | Order Processing | 1 day | Computer 100% | Computer 100% | Depot/Head Office | 100% | |
| | Transport man. | 1-2 days | Comp 57% Man 43% | Man 71% Comp 29% | Depot/Head Office | 100% | 100% |
| | Building & plant | 2-3 days | Manual 100% | Man 50% Comp 50% | Depot/Head Office | 100% | |
| | Personnel | 1-2 days | Man 83% Comp 17% | Man 83% Comp 17% | Depot/Head Office | 100% | |
| 5 | Goods In | 1 day | Computer 100% | Computer 100% | Head Off/Supp'r/Dep | 100% | |
| | Dep Inventory man. | 1 day | Comp 71% Man 29% | Computer 100% | Depot/Head Office | 100% | |
| | Order Processing | 1 day | Computer 100% | Computer 100% | Depot/Head Office | 100% | |
| | Transport man. | 1-2 days | Comp 57% Man 43% | Man 71% Comp 29% | Depot/Head Office | 100% | 100% |
| | Building & plant | 2-3 days | Manual 100% | Man 50% Comp 50% | Depot/Head Office | 100% | |
| | Personnel | 1-2 days | Man 83% Comp 17% | Man 83% Comp 17% | Depot/Head Office | 100% | |

Table 6.5 summarises the development of the depot and distribution system PM developments. Viewed as a whole the pattern of PM development is very similar to that of the store - limited PM availability in the early phases with data input and output dominated by manual methods, and then by the end of the third phase 97% of the PM structure is completed. This rate of PM implementation is slightly higher than in the store (94%) at the same stage of evolution. The rate of computerisation of the input and output in the third phase of development is somewhat slower than the store system and this may be explained by examining Table 6.2 depot inventory management section. Here it will be seen that the aspects of the inventory PM systems that are being implemented are those associated with the activities of individuals or delivery operations within the depot - percent correct pick per operator for instance. These kind of PM's require a sampling system, usually with manual checking and data entry, and these systems are notoriously difficult to implement and often give indifferent results for analysis. This problem has been noted in several distribution and inventory control environments by Fernie (1990) and Oxley (see Cooper, 1994, p.184). Attacking these problems requires a lot of management time and the majority of depot managers often do not seem to be inclined to spend energy in areas where they perceive they get marginal improvements (Rees, IB:PR1:05:93). By phase 4, as with the store, the PMS is complete. Changes that are occurring during this and the subsequent phase are mostly associated with increased computerisation of input and output to the system with concomitant improvements in the response time of the PM reporting system.

The analysis of the Head Office PMS (Table 6.6) while showing a similar overall pattern to the depot and store developments, has a distinctly slower start. At the end of the first phase only 35% of the PM's have been implemented and these are related to the core

## *Table 6.6 Summarised Head Office Performance Measurement Analysis*

| Phase | Focus for Perf Meas | Fastest PM Resp Time | Dominant data I/P | Dominant data O/P | Primary/secondary data destination | % of PM's used in this phase per item | % of PM's used in phase overall |
|---|---|---|---|---|---|---|---|
| 1 | Buying functions | 2 days | Manual 100% | Manual 100% | Func man/Depot/ Gen man | 66% | |
| | Selling functions | 2 days | Manual 100% | Manual 100% | Func man/Store/ Gen man | 40% | |
| | Product development | n/a | None | None | None | 0% | 35% |
| | Replenishment func. | 2-3 days | Manual 100% | Manual 100% | Func man/Depot/ Store/Gen man | Poss 60% | |
| | Corporate Management | 1-5 days | Manual 100% | Computer 100% | Gen man | 43% | |
| 2 | Buying functions | 1-2 days | Manual 100% | Man 75% Comp 25% | Func man/Depot/ Gen man | 66% | |
| | Selling functions | 1-2 days | Manual 100% | Man 25% Comp 75% | Func man/Store/ Gen man | 40% | |
| | Product development | n/a | None | None | None | 0% | 55% |
| | Replenishment func. | 2-3 days | Manual 100% | Computer 100% | Func man/Depot/ Store/Gen man | 66% | |
| | Corporate Management | 1-5 days | Manual 100% | Computer 100% | Gen man | 64% | |
| 3 | Buying functions | 1 day | Comp 66% Man 33% | Computer 100% | Func man/Depot/ Gen man | 100% | |
| | Selling functions | 1 day | Man 50% Comp 50% | Computer 100% | Func man/Store/ Gen man | 40% | |
| | Product development | n/a | None | None | None | 0% | 71% |
| | Replenishment func. | 1 day | Manual 100% | Computer 100% | Func man/Depot/ Store/Gen man | 67% | |
| | Corporate Management | 1-3 days | Comp 57% Man 43% | Computer 100% | Gen man | 86% | |
| 4 | Buying functions | 1 day | Computer 100% | Computer 100% | Func man/Depot/ Gen man | 100% | |
| | Selling functions | 1 day | Computer 100% | Computer 100% | Func man/Store/ Gen man | 100% | |
| | Product development | 1-3 days | Manual 100% | Computer 100% | Func man/Gen man | 100% | 100% |
| | Replenishment func. | 1 day | Comp 67% Man 33% | Computer 100% | Func man/Depot/ Store/Gen man | 100% | |
| | Corporate Management | 1-2 days | Computer 100% | Computer 100% | Gen man | 100% | |
| 5 | Buying functions | 1 day | Computer 100% | Computer 100% | Func man/Depot/ Gen man | 100% | |
| | Selling functions | 1 day | Computer 100% | Computer 100% | Func man/Store/ Gen man | 100% | |
| | Product development | 1-2 days | Manual 100% | Computer 100% | Func man/Gen man | 100% | 100% |
| | Replenishment func. | 1 day | Comp 67% Man 33% | Computer 100% | Func man/Depot/ Store/Gen man | 100% | |
| | Corporate Management | 1-2 days | Computer 100% | Computer 100% | Gen man | 100% | |

operating functions of buying, selling, replenishment and the corporate cash control functions. The product development function, responsible for new products and product evaluation, may not exist at all for the first two phases, or if it does it is likely to be at a very low level. During the entrepreneurial phase management focus is on getting the right product mix, but of products that almost certainly already exist as proprietary brands. By the end of the pre-bureaucratic phase competition on the entrepreneurial product mix would not yield enough profit to fund growth. The tactics chosen by management are usually to develop own brand products, usually a small subset of the overall product lines, and then to use these lines to lead their competitive promotions. This takes pressure off the branded products competition, leaving them to give a reasonable yield while the own brand products encourage the customers to come to the shop. These tactics may seem crude but they are effective. In later phases product development becomes more important as the range of own brand products is extended and may become profitable in themselves. Some companies such as Marks and Spencer use this approach not as a tactic but as a strategy, and all food sold is own brand. It would not be possible for Sainsbury, Tesco or Safeway to only sell their own brands as they have such a wide product portfolio in comparison to Marks and Spencer.

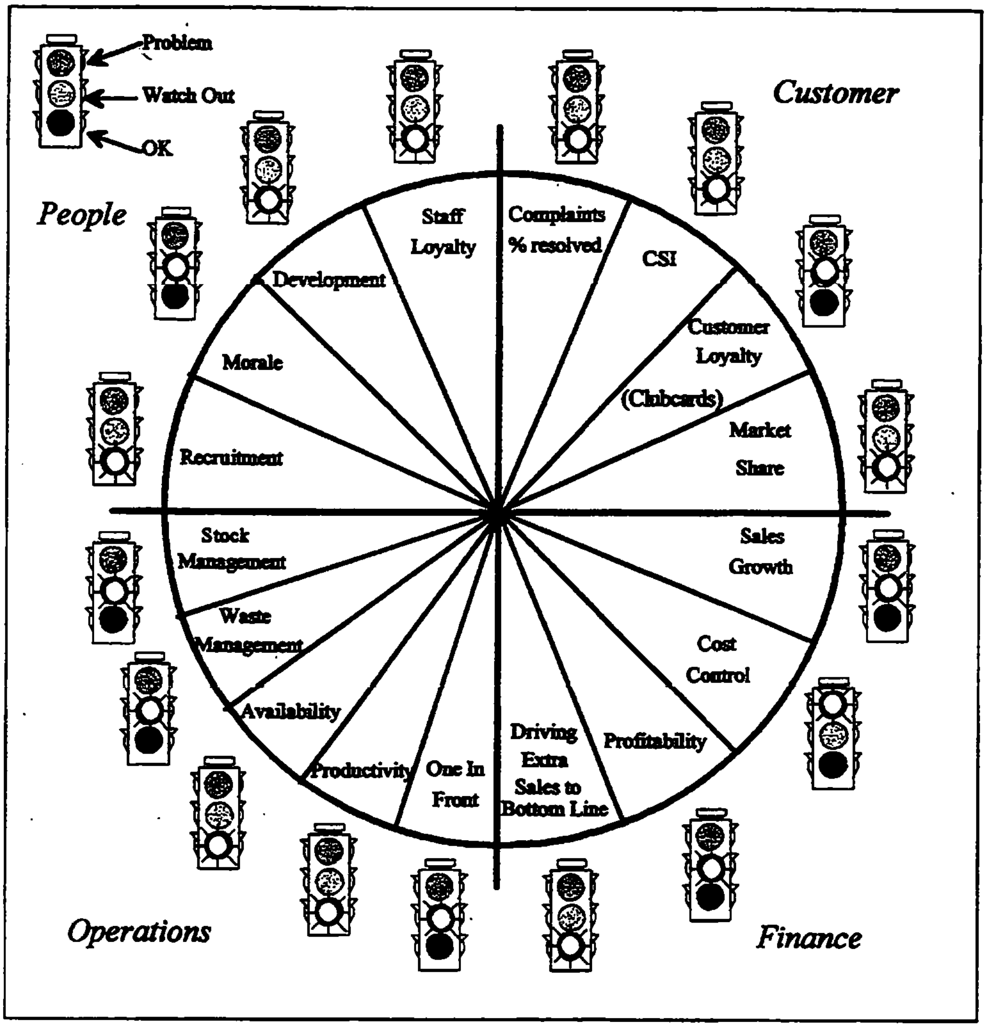
As the organisation moves into its third phase, and is better able to support the costs of a more sophisticated PM system and a larger Head Office staff, the remaining Head Office functions begin to develop. The relatively low level of PM implementation in phases one and two (35% and 55% respectively) moves up to 71%, and while this is still less than the store and depot/distribution PMS which by this phase have reached maturity, the important corporate management and strategic PM's are beginning to evolve. Examination of Table 6.3 and the corporate management function PM shows that dominant input/output methods are computer based and that many of the PM reports require information to be passed from several sources. These are less of a problem if the information systems are integrated which is indeed what happens at the end of this phase. It may be reasonably argued that failure to integrate the individual systems would actually inhibit further growth because the information processing overhead would grow very quickly as the product range and trading volumes increase. Historically, Sainsbury and Tesco were at the stage in the late 1970s, and as the company histories in Chapter 5 and Appendix 2 show, system integration was an important factor in paving the way for significant geographical expansion.

Much of the PM development at Head Office in this and subsequent phases of organisation change are focused on refining the monitoring processes within the separate corporate functions and at an organisation wide level. During Phase 4 development it becomes possible to get a corporate view of events throughout the whole organisation and this becomes one of the important corporate management tools. Montagnon, (1993b) stressed the importance of this facility for corporate management. He indicated that Sainsbury's directors convene in the Board Room every working day at 07.30 hrs. and review the group performance by store, region and nationally. Montagnon (1993a), Winch (1993) and Harris (1997) all agreed that during Phase 4 and Phase 5 there was a shift in the focus for information analysis from being mostly for operational purposes, to providing information and *knowledge* to support strategic decision making. Winch (1997) in a subsequent interview went as far as to suggest the information systems in Safeway were now presenting management with future strategic possibilities that they were having difficulty in assessing within the current view of the food retailing world.

Taken as a whole this analysis of PM's in the food multiples clearly illustrates the increasing dependence of the operational aspects of the business on information processing technology. The PM's throughout the phases reflect both the organisation's and the management's sophistication. In the early stages the PMS is focused on basic operational functions giving simple feedback to store, depot and Head Office. By the middle stages of corporate evolution the increasing complexity of the operations requires the information system to begin to automate some of the managerial functions throughout the organisation. The individual managers role begins to include checking that reality coincides with the information system's view of the world. During the final two phases of development this process continues and there is a very real danger that the operational management throughout the organisation begins to feel alienated, disenfranchised and possibly confused by the large number of PM reports that they are faced with. This danger is recognised by many senior managers who are concerned that the PMS, so long the instrument of control and order throughout the system, will be deliberately ignored by disaffected operational managers. One initiative by Tesco to overcome this problem and re-engage their management's enthusiasm for their PMS has been to re-focus their PMS on the balanced scorecard approach of Kaplan and Norton (1996). In the store this new PMS initiative is called the Store Steering Wheel. The focus of the PMS has moved away from functional aspects of the store to four basic categories of PM's called Customer, People, Operations and Finance. This simplification of the store PMS is designed to -

> "create a balanced set of measures to manage store
> performance in a simpler, more effective way."

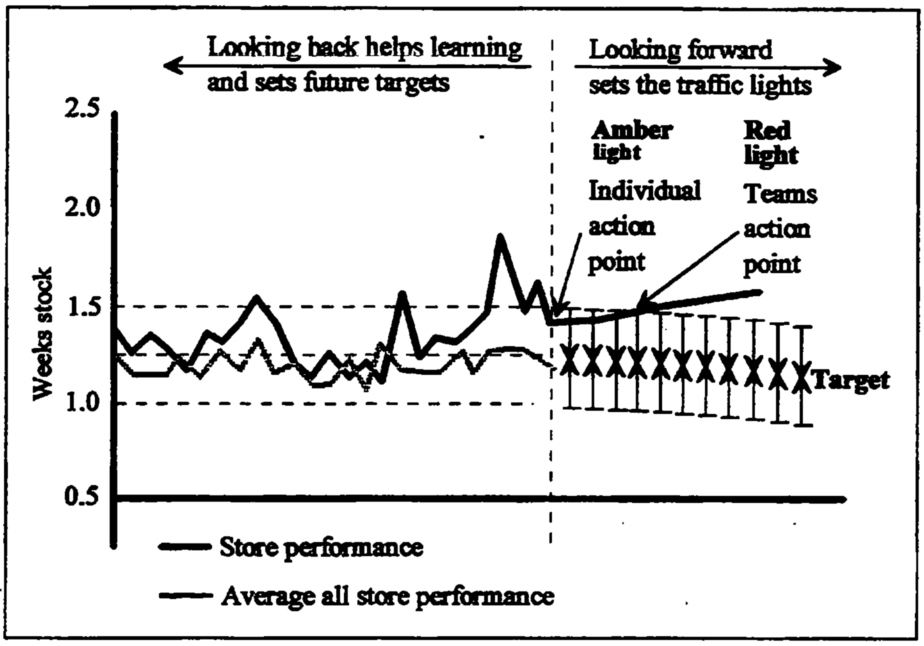
The Store Steering Wheel is illustrated in Figure 6.1.




(Source: Adapted from Tesco staff presentation material)

**Figure 6.1 The Store Steering Wheel**

(N.B. In the actual reports the traffic lights are coloured making the presentation more effective.) This diagram presents the control data in broad conceptual terms and in the previously described categories. The categories are subdivided into four or five sub-catgeories each of which has a single PM focus. So for instance the Finance group of PM's has Sales Growth, Cost Control, Profitability and Driving Extra Sales to the Bottom Line as it's sub-categories. Each of these sub-categories has a traffic light that indicates whether or not that sub-category is within it's target range. These target ranges are calculated on the basis of the overall average of the comparator group and of the corporate performance objectives. This is illustrated in Figure 6.2




(Source: Adapted from Tesco staff presentation material, 1997)

**Figure 6.2 How the traffic light mechanism works**

This is a simple mechanism that illustrates past performance on one side of the date line and target future performance on the other side of the date line. In this particular instance the store actual performance is off target and an individual manager, who is responsible for managing this aspect of the store performance will see the amber traffic light. This should trigger action to try to remedy the problem. Should the problem get worse then team action is triggered and more store management resources are dedicated to trying to solve the problem. The thinking behind this changing approach to PM is rooted in the Deming Cycle of 'Plan - Do - Check - Act' and the Total Quality Management team problem solving activities. With the Tesco adaptation of these ideas it is the 'Steering Wheel' that identifies the problems. This is a very good example of the way in which food multiples like Tesco are trying to change the inherited autocratic culture that tended to use the performance measure like a stick, and that often failed to enable managers understanding of the PM system.

### *6.3 Operational strategies, core competences and strategy*

The subject of operational strategies is poorly explored in service industries research. In comparison manufacturing operational strategies attract far more interest. Why this should be is not clear. One possible explanation is that manufacturing organisations are more stable and behave in more predictable ways. A more likely explanation is that the variety of service industries is very large and therefore trying to arrive at a universal definition of operations strategies is consequentially much harder. Also, it is only in the past twenty years or so that serious research has been undertaken in the service sector. Therefore the accumulated body of knowledge is still rather limited. Whatever the reason, it is important for this research to examine the role of operational strategies, their relationships with the core and distinctive organisation competences and how these factors interact with the strategy making processes in the food multiples.

Bearing in mind the problems of finding widely accepted definitions of strategy and competences specific to the service sector, the analysis of the organisation control structure will use the following definitions of strategy and competence. At a broad conceptual level Johnson and Scholes (1993, p.11) identified three levels of strategy. These were the *corporate strategy*, concerned with financial market; *competitive and business strategy*, concerned with how to compete in a market; and, *operational strategy* concerned with how the functional activities of an organisation contribute to the other levels of strategy. The food multiple *core competences* are defined as those capabilities that are necessary to compete and survive in the food multiple market place (Teece, 1992), and the *distinctive competences* are defined as those competences that give the food multiple a market edge (Grant, 1991).

The early part of this chapter has explored the relationship between the evolution of PM's and the phases of corporate evolution of the food multiples. This analysis not only showed which PM's evolved and when they evolved, but also how they have been used as a control mechanism in the food multiples. These PM's are a vital clue as to how the control system of the food multiple works, and using them together with the other information already discussed in Chapters 4 and 5 it is possible to create a model of how the overall control system works.

To begin with the three strategic levels predicted by Johnson and Scholes exist in the food multiple. The corporate functions in the Head Office, the competitive functions in the Head Office and the operational functions in the stores and distribution chain.

The Phase 1 corporate functions at Head Office include overall monitoring of the money position and cash flow forecasting, gross profit analysis, general stock and trading activity monitoring (Table 6.3). These are the core corporate competences for Phase 1. Strategy formulation may not actually be a formal function at this stage of the corporate evolution. As the organisation develops through phases 2 to 3 new corporate functions are added. These include refining the monitoring procedures of the store and distribution chain, competitor evaluation as a basis for strategy formulation, productivity analysis of different parts of the system as the basis for efficiency evaluation and future investment, and closer evaluation of expenses and costs in the system. The strategy function of the food retailer evolves quickly throughout these two phases. It does so for two reasons: the need for external investment requires long term strategies to convince institutional investors that the management understand their business and can plan for the future; and the need to develop operational strategies that aid operational managers to control the rapidly expanding volume and variety of produce sold by the organisation. The operational strategies that will evolve most quickly are those associated with the by now established core competences of effective merchandising, a well organised supply chain and an efficient trading style and format. Phases 4 and 5 add the sophisticated analysis of customer generated data from EPoS and loyalty card schemes that permits the organisation to devise detailed strategies that are focused on individual, group or geographical buying behaviour patterns. These developments are critical for the customer care and communications functions in the organisation and for the formulation of operational strategies related to these functions.

The competitive strategies of the food multiples work within the general corporate strategy. These strategies are generated by functional specialists within Head Office and include the buying functions, the selling functions, the replenishment functions and the product development functions (Table 6.3). The competitive strategies are influenced by the phases of evolution of the organisation in the same way as the general strategy. In the early phases of evolution the competitive strategies are focused on survival in the first instance, and subsequently on market position consolidation. It is critical to have produce at the right place at the right time and at the right quality. All of the competitive strategies have to be co-ordinated to ensure economy in the use of resources, efficiency within the distribution and selling activities, and effectiveness in satisfying the customers needs. Long term planning in the evolution of these competitive strategies becomes increasingly important in order to ensure that the market aspirations of the organisation can be achieved. This will almost certainly include the acquisition of technology, premises, and the long term development of people with the correct skills to manage different parts of the organisation in the future. Information for this long term planning needs to be processed and co-ordinated in an effective way and this is a major driver for the development of information processing focused on Head Office activities rather than the operational activities of the organisation. This information processing will include data analysis packages, forecasting software and possibly mathematical modelling software. To enable these activities to be undertaken data is required from the business environment, from operations and from the actual effectiveness of the previously described operational strategies. Therefore it seems that the activities that generate the competitive strategies progressively enable the creation and maintenance of the core operational competences. Within the context of the food multiples therefore, the Head Office functions that are not associated with corporate functions may reasonably be said to generate *enabling competences*, and these may be either core or competitive competences as they have been previously identified.

The operational strategies are effective in the operational aspects of the organisation. The help to set the operational performance targets and the PM's of the operational units throughout the distribution chain and within individual stores. The operational strategies set broad parameters for the short term planning aspects of the system. The short term planning of the operational activities also takes information from the market and trading environment and feedback from actual operational performance. An example of this kind of control has already been discusses and illustrated in Figure 6.2. During the early development of the organisation the operational feedback may be direct to the short term

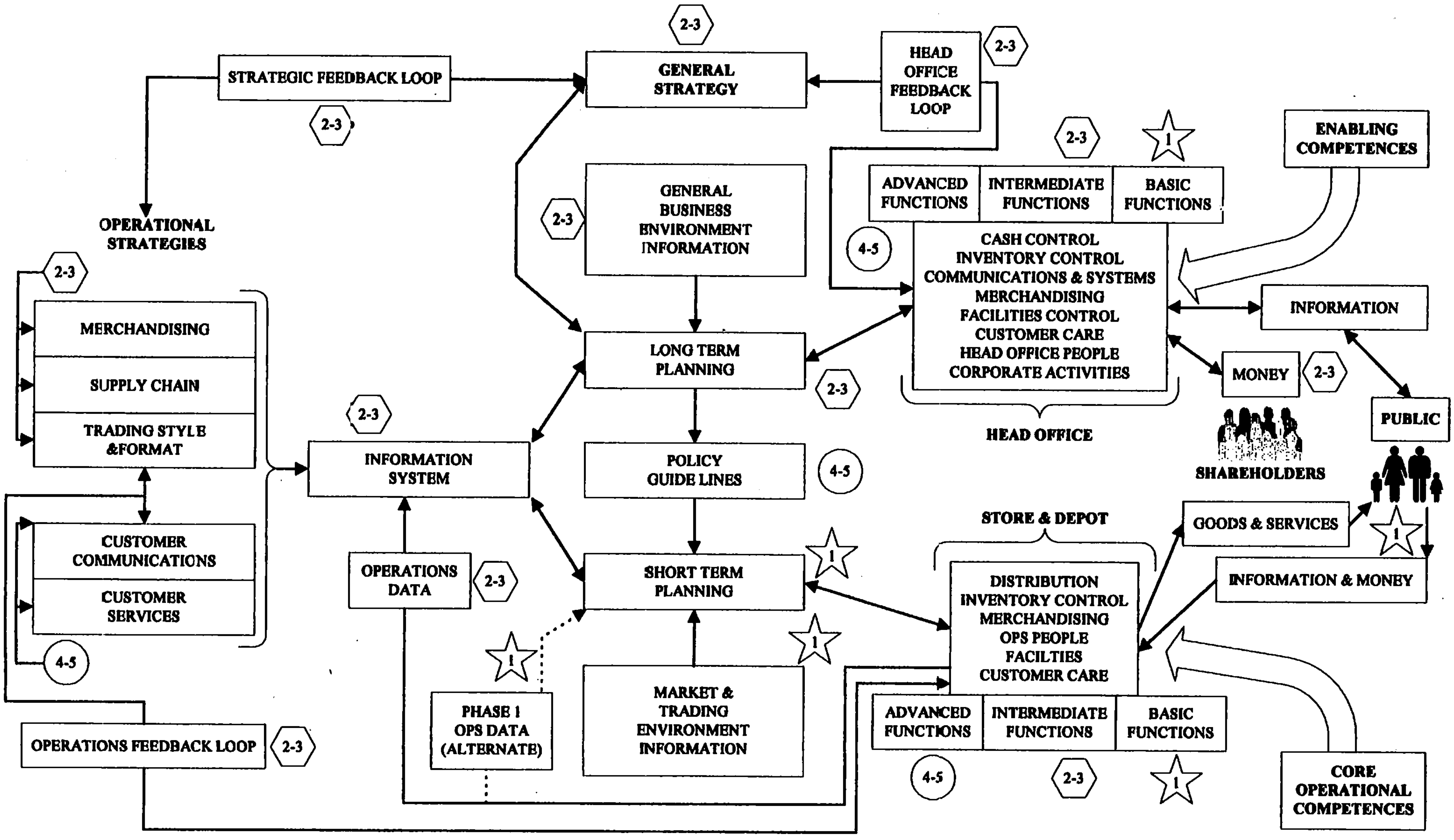
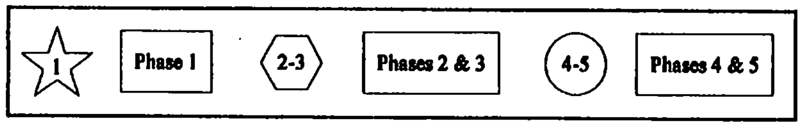



Fig 6.3 General food multiple control system diagram



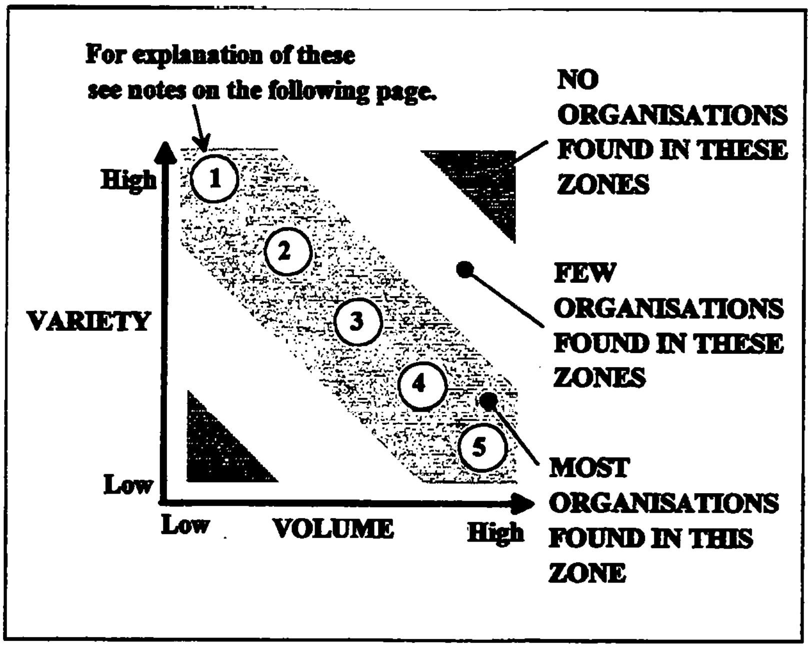
planning function, but as the organisation grows this information needs to be processed through an information processing facility. Tables 6.1 and 6.2 indicate the way in which the PMS evolve in the operational aspects of the company during Phases 1 to 5.

The relationships between general strategy, competitive strategy and operational strategy effectively set the control structure for the whole organisation. These relationships and the control structure previously described are illustrated in Figure 6.3. This diagram clearly shows how the information system is the main link between the operational strategies, the operations data, long term planning and short term planning. Without the information system it would be impossible to correlate, process and co-ordinate the information necessary for both long and short term planning activities of the food multiples. These activities are essential for control of operations, and via the long term planning functions for the determination of the general strategy of the organisation. However talented the management is, their effectiveness will be limited by the quality, scope and timeliness of the information they have to work with.

### *6.4 Conclusion*

By linking the phased development with the evolution of performance measurement, operations strategies and core competences, this chapter has shown that information technology has changed it's role throughout the corporate development of the food multiples. At first it was simply a basic core competence that processed operational data for basic control functions. Then it began to assist the long term planning functions within the organisation and it's role began to develop as a distinctive competence. Once the technology became fully developed and the information system was an important driver for strategic activities it became the identifier and developer of new core or distinctive competences by providing knowledge rather than simply data to the management of the company. *In this role it can be reasonably claimed to be leading corporate strategy rather than simply enabling corporate strategy*, a fact that can be easily overlooked if the overall corporate control system is not examined in some detail.

In a broader academic context the influence of technology in general, and information technology in particular, on operational and corporate activities has been the subject of much research (see Chapter 2, Part 2). It was Johnson (in Voss et al, 1991, p.270) who identified "the development of technology and a differentiated service" as one of three main operational strategies in the service sector. And in broad terms this research would support this contention in the context of the food multiple retailers. There are however differences to be observed between the conventionally accepted view of the operational application of technology in the management of volume and variety. One of the interesting issues that emerges from a comparison between the results of this research and the previous research is how much of this previous research has been based on a 'snapshot' approach. That is several organisations may have formed the basis of the research, but the investigation is only focused on the current state or recent history of the organisation (e.g.Woodward, 1958; Pugh, 1976; Matthews, 1989). This approach is important for looking for patterns or grouping of organisations or functional phenomenon (or both). In turn this helps to codify different aspects of organisations or relations within organisations. However, by tracing longitudinal development and change, whatever the problems of the accuracy of data and reliance upon qualitative approaches, a different view is formed of the way in which the dynamics of organisations change through time. These trends and dynamics, together with the insights gained from other approaches, are likely to give a better basis for understanding future options and determining the scope for realistic action than steady state classifications alone. Also this investigation clearly demonstrates the link between technology and organisational behaviour in that as technology has changed so the organisations have adapted to the opportunities presented to them by utilising the new technology. *This suggests that technology, particularly in the context of the latter half of this century, has had a much larger influence on retail organisational change than has been previously thought.* Although not an objective of this research, this finding has a bearing on the research of




(Adapted from Hayes & Wheelwright, 1984)

**Figure 6.4 Volume / variety dispositions of organisations**

Hayes and Wheelwright (1984) who suggested that taking volume and variety as axes, the majority of organisations would lie on or around a line that was defined at one end by high variety / low volume, and at the other by low variety high volume (Figure 7.4). In this model the technology used by the organisation and the dominant management style depended upon where the organisation was in the volume/variety spectrum. Implied in this model is that as organisations grow in size and complexity their characteristics will follow a predictable pattern. Using this graph Hayes and Wheelwright developed a typography of organisations and their disposition (N.B.. position numbers refer to those in Figure 6.4):

Position 1: - *Project organisations*, one off volumes / v. high variety. Typically civil engineering or professional services. Project management style. Multi-purpose technology.

Position 2: - *Jobbing organisations*, low volumes / high variety. Typically a small pottery or group therapy services. Informal management style. Multi-purpose technology.

Position 3: - *Batch organisations*, medium volume / medium variety. Typically contract engineering or education. Semi-formal management style. Mixture of general purpose and specialised technology.

Position 4: - *Mass production organisations*, low variety / high volume. Typically motor car manufacture or banking. Formal management style. Special purpose technology.

Position 5: - *Continuous production organisations*, no variety / very high volume. Typically chemical plant or sewerage disposal. Semi-formal team based management style. Highly specialised technology.

This typography originally used to describe manufacturing organisations has since been adapted to describe organisations in the service sector (Slack et al, 1995). In these contexts this theory is widely accepted and has been used to define the operational characteristics of the respective classifications (Evans, 1993). *This research indicates that the food multiple retailers, with organisations that handle very high volume of products and a very high variety of products, exist in one of the prohibited regions of the graph in Figure 6.4* (i.e. top right hand corner). Statistics regarding the retail market identify a significant number (albeit declining) of small corner shop configurations that have low volume and low variety trading characteristics (Nielsen, 1997). This configuration is also in one of the prohibited regions of Figure 6.4. There is a coincidence between middle volume / middle variety in both manufacturing and retailing organisations. Assuming that the definition of high variety in the Hayes and Wheelwright model is met by the food retailing multiples, in that they not only supply a large number of individual items but also offer a wide range of ancillary services, then these conflict conditions gives rise to four propositions.

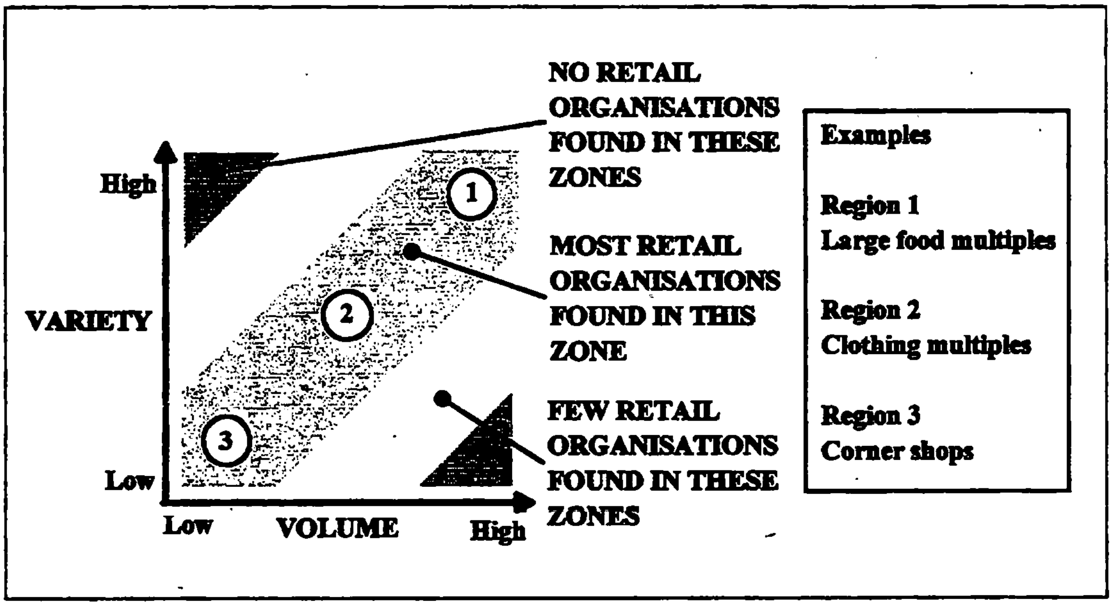



**Figure 6.5 Volume / variety dispositions of retail organisations**

*Proposition 1*

Retailing is totally different from every other kind of organisation and it requires a different typographical diagram that predicts the volume / variety distribution of retail organisations as axiomatically different from the Hayes and Wheelwright model (Figure 6.5).

*Proposition 2*

The original Hayes and Wheelwright theory is unique to manufacturing and that subsequent attempts to fit services to this model have been mistaken. The implication of this is that sectors of the economy (e.g. manufacturing, health service, retailing) should not be treated collectively and each will have their own volume / variety characteristics.

*Proposition 3*

That Hayes and Wheelwright were wrong in suggesting that organisations could be classified to use the volume / variety typology and that as a consequence the concept should be abandoned all together.

*Proposition 4*

The original model in which there are prohibited zones be replaced with a cluster model in which there are no prohibited zones (Figure 6.6). General observations would suggest

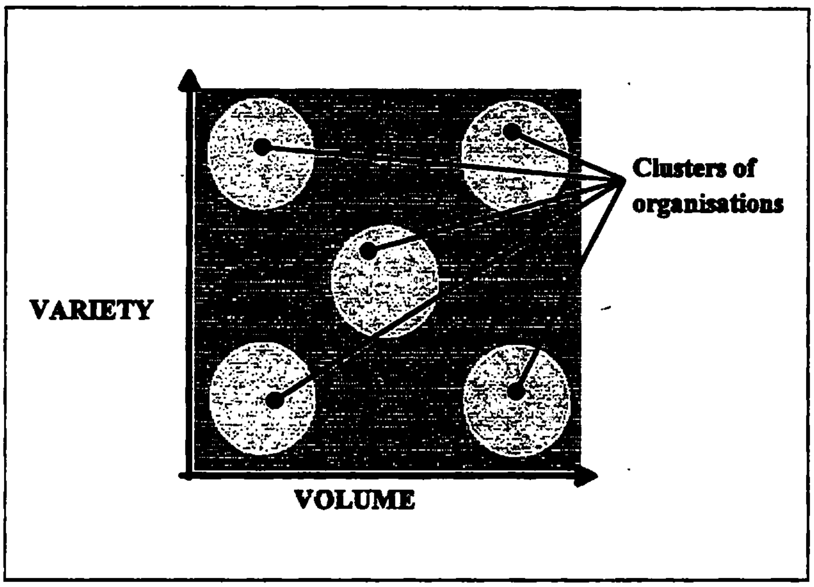



**Figure 6.6 Suggested volume / variety dispositions of organisations**

that proposition 1 is not correct as retailing configurations can be found that operate in one of the prohibited zones in Figure 7.5. For example in the upper left hand corner a specialist retailer of cheeses would have a high variety/low volume characteristic. In the lower right hand corner a fast food retailer would have a high volume/low variety characteristic. Propositions 2 and 3 are difficult to comment on as further research would need to be done to confirm which of these are true or not. Proposition 4 does satisfy the Hayes and Wheelwright position in part, and the results of this research in part, and may therefore be a more valid model to adopt when considering a wide variety of manufacturing and service organisations. Certainly there is evidence that in the manufacturing sector the development of the concept of 'mass customisation', based on sophisticated control of high volume production with computer systems, supports the need for further research focused proposition 4.

In conclusion to this chapter it is worthwhile quoting Winch (1997) who neatly summarised the current state of the information technology, control systems and the feelings of nearly all of the managers that were interviewed.

> "We are just beginning to appreciate the opportunities that the systems are offering us.... We have moved from being store focused to being product focused..... We have completely reorganised the store management structures to respond to customers.... We had a mass market business in the 1980s and now we can respond to individuals..... and we are now far more effective in our marketing and efficient in our operations."

# *Chapter 7*

## *Summary, Conclusions and Reflections*

### *7.1 Summary*

Chapter one of this thesis began by examining the reasons that information technology has become so important to the food multiples and identifies the objective of the research as -

> ***"(seeking) to demonstrate that in the case of the multiple food retailers as well as enabling retailing strategies, information technology is now beginning to lead retailing strategies as it transcends the role of processing operational performance data, and moves to providing knowledge upon which management are basing their future strategies."***

The chapter continued by examining the broad market and demographic issues that affected the food multiples during the 1980s. This period was particularly significant for the food multiples in terms of information technology change as EPoS, the key that unlocked much of the potential of retailing information systems, became widely used. This was also the period in which information technology began to make the transition from an enabling phenomenon, focused primarily on operational issues in the food multiples, to a complex phenomenon that influences the operational boundaries and corporate strategies.

Chapter two contains the theoretical underpinning for the research. The chapter is divided into four sections that reviews the literature on strategy, technology and organisations, performance measurement and distribution. The literature on strategy begins by tracing the way in which the thinking about the strategy process has changed as our understanding of organisations has improved. Initially strategy took many of its precepts from military thinking and a deterministic or unitary view of life. Today the view of the strategy making process is more opportunistic or pluralistic. The difference between these approaches an organisation can adopt being closely related to the extent to which an organisation can manipulate its environment, the management can manipulate their employees and the rate of change of the market place or market niche it services. The other aspect of strategy examined was that of the internal strategy and the way it interfaced with the global strategy of the organisation. Here the concepts of competitive strategies and operational strategies as a hierarchy was found to be important in the establishment of core competences as a competitive tool. Core competences were particularly important in the context of the food retailer where competition and high standards of service were particularly critical.

The literature that explored the relationship between technology and organisations examined the issue of technological determinism from several points of view. These ranged from the impact of technology on management systems and organisation structure, to the divisions that exist between technology management and general management. In many ways this was an area where discussion about technology and strategy was expected to be found. However, although it was alluded to in several publications, it was not discussed specifically in the context of the food retailers.

The literature about performance measurement was helpful in two specific ways. The first was in establishing the link between performance measurement and strategy - a key issue explored more fully in Chapter 6. The second was the evolution of performance measurement from a rather crude retrospective financial tool, to that of a balanced system of measures that examined the performance of an organisation from several perspectives. This new perspective has been particularly important for the food retailers in the development of more proactive and effective management.

The final part of the literature review focused on the distribution systems that are such an essential part of the modern food retailing multiple. This aspect of the literature review was to be rather enigmatic as the literature seemed to lack much of the clear thematic structure that other aspects of the literature search had. In broad terms much of the literature had a fairly pragmatic origin and was problem centred, asking questions such as - What is the best route for a lorry to take in delivering to stores? What is the best dispositions of depots to reduce distribution costs? How can stock ordering be planned to reduce or eliminate stock holding in various parts of the distribution chain? Collectively these loosely connected questions form a body of literature that are important for the retailers but which lack a clear focus at a macro level.

There were two outcomes of this literature review. *The first outcome was to confirm that this research would make an original contribution to the academic literature associated with food retailing multiples. The second was to identify the key issues that the methodology needed to address and to give an indication of the structure that the methodology should take.*

Chapter three, the Methodology, described the approach taken to the research, the reasons for taking that approach, the structure of the research programme and the main sources of information used in the following three results chapters.

Chapter four (read in conjunction with Appendix 1) is the first of the results chapters. The focus for this chapter is the structure and functionality of the food multiple retailer information system. This data in itself makes an original contribution to knowledge about multiple retailer information systems as no independent survey of this nature exists at the time of writing this thesis. The chapter has three basic elements - the functionality of the information system, and the hardware and the software structures of the information systems. Taken as a whole this chapter demonstrates the pervasive nature of the information systems that are used to monitor and control the food multiples. There is virtually no aspect of the food retailer that is not measured or monitored in one way or another. To achieve this requires detailed data collection, processing in a timely way and reports sent back to the management at all levels of the organisation as soon as possible. *The information systems are very large and process millions of transactions daily. Some of this information is used to control the supply chain and global merchandising activities within the retailers. Other customer purchase transaction data is stored in data warehouses and subsequently used for geographical analysis, customer buying pattern analysis and to optimise the store merchandising profile. It is in these latter applications where the transition from enabling food multiple activities to leading strategies is most in evidence.*

Chapter five (read in conjunction with Appendix 2) focuses of the development pattern of the food multiples. In the first instance the histories of Sainsbury, Tesco and Safeway were examined in order to better understand the issues that drove the developing food multiples to choose the opportunities they did. The chapter identified two important issues. The first issue, already identified a little earlier, was the impact that EPoS and information technology had on the food multiples. For the first time the open loop of the distribution system could be closed in a meaningful way with information feedback from the EPoS system, and this had a profound effect on the efficiency of the system. The second issue, also related to EPoS and the evolving information systems, was the identification of five phases of evolution - the entrepreneurial phase, the pre-bureaucratic phase, the bureaucratic phase, the systematic phase and the restructuring phase. Each of these phases have distinctive characteristics that are reflected in the increasingly complex control systems and enlarging geographical areas of operations. These phases are strongly connected with the evolution of the performance measurement systems that are considered in Chapter six.

Chapter six draws together the threads of Chapters four and five, and correlates this data with that collected about the development of the performance measurement systems. As indicators of evolving strategy the examination of performance measurement provides some useful insights into the relationships between the core operational competences, operational strategies and overall corporate strategy. Collectively this data was used to develop a model of the retailing information system and this provided a useful conceptual view of the evolving information system and described its pivotal role in the control of the multiple retailer.

### *7.2 Conclusions*

*The primary objective of this research was to explore the changing relationship between information technology and strategy in three food multiple retailers. In doing this, the thesis makes an original contribution to the understanding of this relationship in the food multiple retailing environment, and adds to the existing body of knowledge* *associated with technological relationships in organisations.* The research demonstrates that the information technology systems in the food multiples now exert a great influence on the nature and scope of the strategies that the food multiples adopt. And, whereas it had been a commonly held view in retail and academic circles that information technology only enabled (or followed) strategy, the thesis demonstrates that information technology is increasingly leading strategy. It does this by -

a. increasingly influencing managers view of their business by being the dominant means by which they can effectively monitor, control and understand their operational activities;

b. becoming the most influential source of customer information (e.g. data gathered through EPoS technology is analysed and used for market and customer analysis);

c. defining the limits of managerial action (i.e. the opportunity costs of working beyond the currently defined system limits may be too high, and changes to systems may take an unacceptably long time because of system complexity); and,

d. dominating the organisational paradigm as operational managers increasingly find their role to be one of ensuring that reality coincides with the information systems' view of the operational world.

Evidence for these conclusions is found in the way in which the three food retailing multiples have evolved and how they are now configured. The case histories of Sainsbury and Tesco in particular illustrate that growth beyond a certain size is difficult without the systemisation of operational control elements, and subsequent growth is constrained without the integration of those systems. The Safeway case study clearly demonstrates that establishment of appropriate technology systems is an essential prerequisite if an organisation wishes to trade (and succeed) in the middle - upper quartiles of the food retailer market. In this respect technology may also be regarded as a significant barrier to entry in this market.

As these retail systems grow in size and complexity a stage is reached beyond which individual managers cease to exert significant control. This is not a sudden event. The process appears to begin when individual information sub-systems are integrated, and continues as systems are extended to include more managerial decision taking and further aspects of the business. Whilst these enhancements are usually made in the interest of improving efficiency and with the best of intentions, the senior managers who drive these changes seem to be unaware that they are also increasing dependency on the system. In doing so they are decreasing the flexibility of the overall system and limiting its ability to cope with sudden and unexpected change in the operational or trading environment - something that human beings are quite good at.

The evolution of food multiple systems is a function of changes in geographical coverage, volumes of transactions and of the variety of products sold. It has been demonstrated that the food retailers, as they grow, go through five basic phases - entrepreneurial, early bureaucratic, bureaucratic, systematic and restructuring. Although technology may be in evidence in the first two phases, it is the key that unlocks the third phase and upon which the final phases are dependent. This is a kind of technological determinism that all food retailers are subject to, and through which they must go on their path to national and international trading. However, during the systems evolution they gradually absorb the ideas and expertise of managers and systems designers. And while they appear to be alike at a broad functional level, they have quite distinct characteristics when viewed in greater detail. Ultimately the systems begin to define the organisation itself. One outcome of this assimilation is that the prospects for mergers and take-overs are conditioned as much by the ability of different systems to be integrated as by commercial or market considerations. Another is that replacing the whole information system becomes increasingly traumatic as time goes on.

The second objective of this research was to examine and describe the evolution, structure and content of the modern food multiple control system. By doing this it was possible to gauge the extent to which the technological systems influence the management systems - and ultimately the strategies of the food multiples. Historically the food multiples have always been prepared to invest a great deal of money in technology in general and information technology in particular. It was not possible to determine precisely how much these systems have or do cost. A guesstimate for buying the hardware and software for a modern retail system, with full Head Office and store implementation, would be in the order of £200m to £400m. The final amount would depend to large extent upon the number of stores in the organisation. The cost of upgrading and maintaining current systems is in the order of £20m to £35m per year. With such large sums of money involved in capital equipment and maintenance, and the reliance of the multiples on technology, it might be expected that the food multiples would seek to develop new technology to improve operational or strategic aspects of their business. The sole ownership of such technology could establish a competitive advantage. The reality is that the food multiples have not been great technological innovators - preferring to follow rather than lead. With few exceptions most innovation in retail hardware and software has been centred on the USA. The result of this is that historically the UK systems have lagged behind US developments by 5 to 10 years.

There is some evidence that this time delay is shortening but there are still few technological reference points in the UK. The extent to which this is due to a lack of investment in technological research in the UK, the greater willingness of US retailers to innovate, the inherent conservatism of the UK retailing manager, or a combination of all three of these factors, is not clear. The dangers of a lack of investment are clear however, and are likely to become more evident in a future increasingly defined in technological terms.

During the 1980s there were three important technological milestones that are still influencing the way in which the retailing systems are developing. The first, and historically probably the most important single technological innovation, was the development of EPoS. This proved to be the foundation that enabled the development of active systems rather than the passive systems of the pre 1980s. EPoS data became the driver for: accurate store stock control; better control of the distribution chain; proactive merchandising; direct supplier communication; and, in more recent years, relationship marketing strategies. The extension of EPoS into EFTPoS forged the link between the store and the banking system, and more recently it has allowed the food retailer to take on some of the banking functions.

The second technological milestone that had a great impact on retailer systems was the use of open systems architecture in the design of the retail systems. The UNIX based systems freed the food multiples from the tyranny of the single systems supplier, and of the systems suppliers from having to provide a complete package. These developments made technical innovation simpler and quicker to implement.

The third technical milestone of significance in the 1980s was the improvement of the public telecommunications network. Computer based switching systems replaced the old Strowger electromechanical systems. This change eliminated electrically noisy lines that were a significant barrier to communications between Head Office and stores (e.g. for the collection of transaction data and the distribution of management information). Once established, it made distributed processing a practical possibility, and this capitalised on the increased processing power of the computers used in the stores and the distribution chain.

Today, the opportunities that technology are opening up are challenging existing management thinking and will present new and unanticipated opportunities for the food multiples.

### *7.3 Reflections*

The design of this research programme - defining the structure of the technological systems and constructing the subsequent histories of the retailers - was sound in that it produced enough information to achieve the basic objectives of the thesis. However, with hindsight, the investigation could have been improved and the insights into the organisations refined. The improvements may be conveniently considered in four areas.

To begin with the research focused on the upper levels of management and their perceptions of information technology and strategy. With hindsight it is clear that a lot could have been learned if the store managers attitudes were systematically investigated, because it is at the store level that many of the technical and strategic innovations succeed or fail. Informal conversations with several store managers throughout the research gave some useful insights into the internal managerial relationships in the food multiples. In particular these conversations provided clues about the use of the systems to generate information about the performance of the stores; and, about individual store managers attitudes about the validity of this data. These conversations also provided some useful insights into the relationship between the technologists and the store managers. There seemed to be evidence that some hostility existed between the technologists and the store managers, and that this hostility seemed to be rooted in the different focus of the two parties. The technologists were always keen to improve the system, the managers were always keen to manage the store environment without interference. Neither side fully understood the direction and constraints of the other. An interesting situation of importance for the future and one that deserves a more formal investigation.

Another area that could provide additional insights was that of the design of the systems. The initial pilot study indicated that very little documentation about the systems existed in the public or academic domains. Once research had begum to collect this data it became clear that there was a great deal of commonality in the systems and that the description of a generic system was a feasible option. Such a description was likely to be about 90 to 95% correct in both function and form. As such it would provide a reasonable background against which to judge the relationships between information technology, management and strategy. Again, as the research proceeded, it became clear that many of the variation in the systems design at a micro level were of interest in themselves. Why were there variations in the functionality of software structures designed to do the same job? Were they due to cultural, historical, managerial or technical reasons? Given the historic bias of the investigation, answers to these questions would have provided some useful comparative data.

Finally the design of the research deliberately chose three organisations who operate in the same market sector, and in doing so reduced the influence of economic and trading variables. This simplified the analysis of historical events, the interpretation of present market manoeuvring, and the evaluation of likely futures for the food multiples. However, while this decision undoubtedly ensured that the research programme did not become unmanageable, it also constrained the general validity of the results. It is clear that a broader investigation into a wider selection of food multiples would either confirm or modify the results of this investigation. It would also make a significant addition to the broad understanding of the relationship between technology and strategy. This must be the subject of further research.

This research has added to the understanding of the relationships that exist between technology and strategy. With technology increasingly dominating the operational aspects of organisations this understanding needs to be extended, especially among the managers and directors who control the destiny of organisations. There are still too few managers who are computer and system literate and this is especially evident in the food retailers. The gap between technologist and non-technologist is too wide, and failure to close this gap is likely to lead to serious problems in the future. The basis for this improvement must be a better understanding of the dynamics of these complex situations, and this will only come from the systematic investigation of past and current activities and from progressive management training and development.

# *Appendix 1*

## *Hardware and software configurations*

### *A1.1 Hardware and software architectures*

The fully integrated multiple retail system not only has a complex functional requirement but also a complex hardware and software architecture. The systems are physically large in terms of numbers of pieces of equipment. It is not unusual for a food multiple to have over 300 geographically dispersed stores in the UK and more stores abroad. Each store will have an internal network comprised of several supervisory computers; 30 to 40 checkout EPoS systems; several peripheral systems; one, or possibly two, master file serving computers and an internal and external communications system. There may be up to 15 geographically dispersed distribution centres in the UK and abroad each with its' own computers and goods storage and retrieval systems, and supervisory computers and internal and external communications systems. There may also be several administrative centres with their own internally networked hardware and software. And finally, at the centre of the system will be the Head Office system that in addition to having all of the systems maintenance operations, will also have the executive hardware and software and of course internal and external networking communications hardware and software. Because these are very large systems they are best examined in terms of their component parts, which are -

a. the communications system,

b. the software platforms on which the applications are based,

c. the database systems and their structures,

d. the store hardware and software,

e. the warehouse hardware and software,

f. the head office hardware and software.

Items a, b and c constitute the foundations that support and integrate the complete system. Items d, e and f are the more obvious and visible aspects of these systems and have already been touched upon elsewhere in this chapter.

### *A1.1.1 Communications systems*

While computers are vital to gather and process data within the retail system, the data has to be sent from one computer to another to create an integrated system, and this requires some form of communications network. This need has led to the development of the Local Area Network (LAN), the Wide Area Network (WAN) and the adoption of standard Electronic Data Interchange (EDI) protocols.

Historically the evolution of the LAN has been driven by cost reduction, data integrity and data speed requirements. The first experimental network was developed in Cambridge University by Maurice Wilkes during the early 1970s. The early experiments sought to find ways of establishing hardware and software protocols that would allow several users to communicate using one loop (usually copper conductor coaxial cables). Eventually this research refined techniques of synchronous data transmission and acquired the name of the Cambridge Loop (Needham, 1979). At about the same time other experiments were being conducted at Massachusetts Institute of Technology with different connection configurations and asynchronous data transmission systems. These early systems were slow (data transmission speeds of hundreds of bits per second) and expensive because of the use of conventional copper cabling. They were also prone to electronic noise interference, and the system performance deteriorated significantly if the distance between stations or the loop were too long (usually not more than a few hundred metres). Also the number of users was restricted. Continuous development during the 1980s and 1990s has led to the modern LAN system in which data is transmitted at very high speeds (Kilo bits per second) and copper cables have been replaced by optical fibre cables, wireless transmissions, satellite or infrared links. In modern systems electrical noise problems have been reduced to the point at which a LAN may contain several miles of optical cabling that operates without significant signal deterioration and may have 300 to 500 PCs connected to it.

From the early research three basic LAN configurations were developed and these are illustrated in Figure A1.1. Which of these is chosen for a particular application depends upon primarily upon the speed of transmission required and the volume of data being transmitted. In general the loop and busbar configurations are most commonly found in food retail systems. All of these LAN configurations have three operational elements - the LAN manager applications software, the LAN network hardware and control software, and the LAN protocol. The LAN manager applications software allows the user (either as an individual or as a part of another applications package) to interface with the communications system and to send, manipulate and receive data. To all intents and purposes this management software makes the communications system transparent to the user. Some of the commonly used LAN management packages in the food retailing environment are Novell NetWare, Simply LANtastic, POWERLan (Performance Technology) and SRN (Sharp Retail Network). The LAN network hardware forms the physical connection to the network and the control software controls this physical connection. The hardware is usually in the form of a printed circuit card and associated electronics that is plugged in to the mother board of the computer terminal. This physical connection allows parallel connection of the terminal databus to the network.

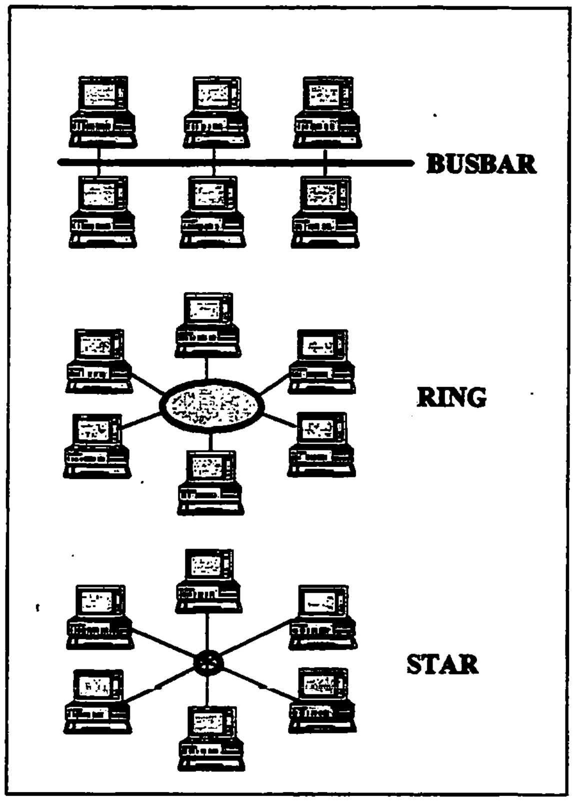



**Figure A1.1 The three basic LAN connection configurations**

The associated software controls data transmission / reception of the synchronous or asynchronous signals. Commonly used hardware and software control systems are Storeloop (International Business Machines), OSLAN (International Computers Ltd.), DECnet (Digital Equipment Corporation), Ethernet, RS232 and RS242. The protocol is an instruction set that maintains data integrity by defining how file data is divided into 'packets' suitable for transmission. A 'packet' comprises of a header containing the destination address, the data, a terminating string of data and a parity check bit to ensure data integrity. The protocol checks for errors during transmission and initiates error correcting procedures if required. If required the protocol may ask for data retransmission. In short the protocol does the 'housekeeping' for the LAN. The most widely used protocol in the retailing environment is the Transmission Control Protocol / Internet Protocol (TCP/IP) although others do exist (e.g. NetBUEI, NFS, IPX/SPX

(Novell)). If these systems are too slow, as may well be the case with some of the hyperstores with very large volumes of data being transmitted, then wireless transmission may be chosen as the communications media within the store. There are two types of wireless transmission - the narrow band system and the switched band system. The narrow band system uses one frequency for transmission between elements of the store system. The switched band system uses several different radio bands simultaneously with the receiver automatically switching between the different bands.

While LANs are used within stores, warehouses and head office WANs are used to connect remote parts of the system together. Although there are many options available for the transmission medium, the most popular in food retailing is the use of the public switched network to connect individual stores to head office, and leased line network to connect the head office computer to the backup head office computer. Historically WAN links have been made via modems (modulator / demodulator) that convert the digital signals generated by the computers to analogue signals suitable for transmission on the public telephone networks. However, more recently the public networks have introduced Integrated Services Digital Network (ISDN) and this allows very much higher transmission speeds. For comparison, the typical transmission speed of a traditional analogue system is 9,600 bit per second and of an ISDN system 64,000 bits per second. Currently the two systems offered by British Telecommunications are ISDN 2 that offers 2 - 64,000 bit synchronous channels, and ISDN 30 with 30 synchronous channels.

The other parts of the WAN system are the management software and the protocol. These have broadly the same function as the corresponding elements of the LAN system. The management software controls the polling activities of the systems , resolves system and polling conflicts, logs activities on the system and provides the interface with head office software. The protocol splits the data into packages for transmission, reintegrates incoming data and checks for data integrity. Popular WAN management packages are Systems Network Architecture (IBM), X-MODEM (Microsoft), CROSSTALK (DCA), CMS (Xcellent). The most popular protocol is TCP/IP although the IBM 2780 and 3780 protocols are still widely used.

The development of so many different LAN and WAN packages is a reflection of the way in which food retail systems have developed. In the period between 1980 and 1990 food retail systems were usually designed, manufactured and installed by one of the large computer companies (e.g. IBM, ICL, DEC, Siemens Nixdorf), and the communications hardware and software was not readily available off-the-shelf. Consequently each of the system manufacturers developed their own 'standard' that became an integral part of their preferred solution for the retailer. As time has passed the large computer companies ceased to manufacture the peripheral equipment and software (e.g. EPoS terminals, weighing machines, scanners), and instead have concentrated on providing the central processing power, communications processing, and integration of the systems. They have been able to do this because of the rapid growth of specialist hardware and software organisations that can supply cost effective peripheral equipment to the large systems integrators. At the time of conducting this research only 40% (value) of a typical food retailing system will be made by the systems integrator.

Although EDI is not a part of a LAN or WAN, it still forms the basis of a standard communication between the food retailers and their suppliers. EDI is used to place orders directly from the retailer's computer to the supplier's computer. In doing this the expense that is associated with processing paperwork is avoided. The only requirement to make EDI work is that both computer systems work to an agreed communication protocol. This protocol must establish the format and sequence of the data sent, and if the data is sent in file format, the file structure. The moves to establish these standards were begun in the UK by the Department of Trade and Industry in the early 1970s when they established the Simpler Trading Procedures Board (SITPRO). SITPRO developed GTDI (General Trade Data Interchange) and eventually this was adopted as the European standard (UN/GDTI). At about the same time the American National Standards Institution (ANSI) developed a similar standard (ANSI.X12) that became adopted throughout the North American continent.

| Country | EDI standards | No. of users 1991 | No. of user 1992 |
|---|---|---|---|
| Austria | SEDA<br>EANCom | 200 | 300<br>15 |
| Belgium | ICOM<br>EANCom | 73<br>15 | 95<br>30 |
| Denmark | EANCom<br>HANCOM | 50 | 200 |
| France | GENCOM<br>EANCom | 400<br>15 | 800<br>30 |
| Germany | SEDAS<br>EANCom | 605<br>6 | 705<br>20 |
| Ireland | EANCom | 30 | 100 |
| Italy | EANCom | 40 | 150 |
| Netherlands | TRANSCOM<br>EANCom | 500<br>10 | 1000<br>150 |
| Spain | AECOM | 102 | 300 |
| Switzerland | EANCom | 10 | 35 |
| UK | TRADACOMS<br>EANCom | 4000<br>100 | 8000<br>300 |

(Source: EAN)

**Table A1.1 Retailing EDI standards in the EC**

Because of the increasing international nature of retail trading and sourcing throughout the 1980s these two standards gradually merged to form a truly international standard adopted by the United Nations that is called UN / EDIFACT. More recently this has been streamlined by the EC called EANCom. Although these standards are widely accepted and used there are still a variations on the basic theme to be found in different countries. These are summarised in Table A1.1. Clearly there is still a way to go before the EANCom standard is completely adopted, however, the evidence in the table suggests that the uptake is rapid and accelerating.

### *A1.1.2 The UNIX software platform*

One of the problems in the design of early food retail systems was that the bespoke solution offered by the major systems manufacturers proved to be a straight jacket in terms of systems development, and expensive in terms of systems maintenance. The reason that the bespoke system was a straight jacket was that any change could only be effected through the software language and hardware conventions of the system supplier. To try to use any other software or hardware required extensive and expensive interface programmes or electronics. In many cases it was simply not worth doing. *The food retailers who pioneered the early systems found themselves at a distinct disadvantage to those who followed them and who adopted more flexible hardware and software conventions*. Maintenance was also to prove expensive as there was in effect only one supplier of the maintenance service who was in a position to charge premium prices.

In fact this problem was endemic in all early computer systems and in 1964 a collaboration between Bell Laboratories, General Electric and M.I.T. in the USA was established to investigate alternative approaches to building computer systems. The basic target for this programme was to develop a universal software platform that would work on any hardware and easily interface with any software. The outcome of this collaboration was a software operating system that was known as 'Multics'. This was a large suite of software that was powerful but very complex and far from the aspirations of the commercial partners in the collaboration. By 1968 Bell Labs became disillusioned with the development programme and withdrew. However, the need for the new software platform had not disappeared, and Ken Thompson and Dennis Ritchie (the Bell Labs personnel associated with the development programme) using the experience they had gained from the Multics project, designed a simpler system that subsequently became known as UNIX.

When designing UNIX Thompson and Ritchie decided to build into the software some key features. The first was that programs written for UNIX should be simple and effective. The programs should be easily linked together so that the output from one program could be the input to another program - in this way more complex systems could be built from simpler smaller elements. The second feature that was built in to the design of UNIX was that the 'kernel' of the programme should be as small as possible and optimised around the essential functions that the programs were required to perform. Other tasks, such as interfacing with other software, should be undertaken by the 'shell'. Fortunately for Thompson and Ritchie a new high level language called 'C' had just been developed, and being a high level language was machine independent. Consequently UNIX was developed in C and by 1973 had been tried on several machines and found to work. From 1973 onwards Bell Labs turned to a collaboration with the University of California at Berkeley to improve the functionality of UNIX. In time UNIX became a multi-user, multi tasking platform that became commercially available in the mid 1980s.

In fact the core UNIX system took two paths during the development process. One lead to the commercial version of UNIX that became known as System V, and the other a development version of UNIX used in universities and known as BSD (Joy 1994).

By the early 1990s System V had been developed by many other organisations and had acquired several 'dialects'. In an attempt to rationalise the 'dialects' the IEEE in the USA established a set of interrelated standards working under the overall name of POSIX. The standards for POSIX.1 and POSIX.2 have been published and these cover the library functions defining the 'kernel' and the 'shell' and standard utilities. In time, other standards will be issued for test methods and conformance (POSIX.3); real-time extensions (POSIX.4); ADA language bindings (POSIX.5); security (POSIX.6); systems administration (POSIX.7); transparent file access (POSIX.8); and, FORTRAN language bindings (POSIX.9). In theory, when these standards have been completed they will define the system. In practice, the current commercially available UNIX derivatives form the basis of what are commonly known as open systems. Currently there are several consortia of manufacturers who are trying to establish open systems standards - UNIX International (promoted by NEC, Unisys, NCR and Sunsoft); Common Open Software Environment (promoted by Hewlett-Packard, Santa Cruz Operation, IBM, Sun Microsystems, Univel and UNIX Systems Labs); and, Open Systems Foundation (IBM, Digital Equipment Corp., Olivetti, ICL, Siemens Nixdorf and others).

In the UK the retail systems suppliers offer a wide choice of UNIX derivatives. The evidence gathered during this research programme indicates the choice tends to be driven by the hardware supplier rather than by the user expressing a preference. So for instance of the three largest food retailing systems developers build their systems on AIX (IBM), SCO UNIX (ICL) and UNIX (Siemens Nixdorf). However, the other significantly sized food retail systems suppliers (Alcatel, AT&T GIS, BIT Microskil, Datafit, JDA RIS, MHG Systems, Matra Systems, Olivetti, Omron Systems, Pennine Computers, PSI Software, RTC and RBS), offer UNIX platforms such as HP-UX, SINIX-V and AVION. Savage (1995), suggests that on the basis of annual licences sold in the UK SCO UNIX appears to becoming accepted as the de facto standard.

The structure of a typical UNIX based package is illustrated in Figure A1.2. The kernel of the system contains the core software whose function is to talk to the hardware platform and to manage the internal system communication functions. The shell handles the low level housekeeping filing and system functions. It is the shell level that the user is connected to and through the shell that the user accesses the application software and database structures. The application software is accessed through a conventional

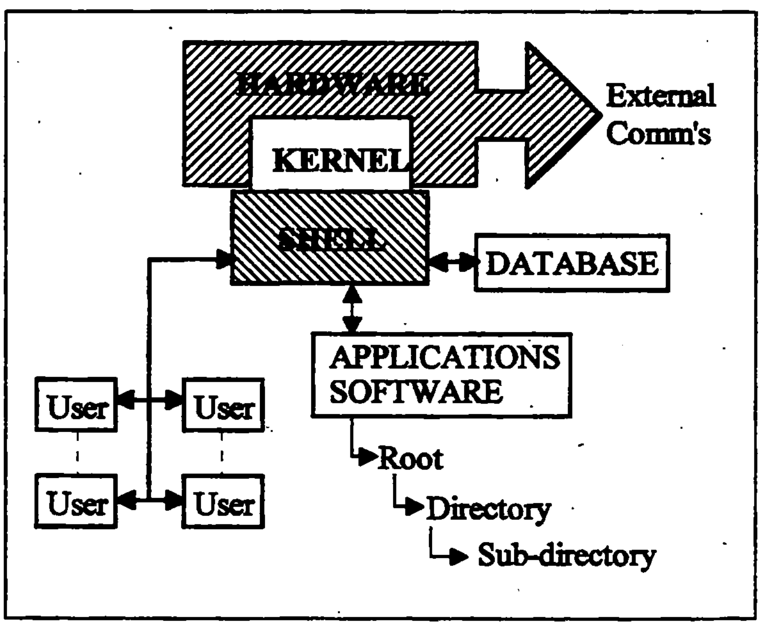



**Figure A1.2 The UNIX system structure**

directory based tree structure. Functionally, UNIX can be considered as a very fast multiplexer that can be programmed to resolve the problems that are inherent in a multi-user, multi-tasking environment.

Although some of the systems builders use the UNIX base throughout their system it is most commonly found in Head Office and distribution operations. At the store level, PC based multiuser systems such as IBM OS/2 and Microsoft Windows 95, in conjunction with LAN software perform a similar function to UNIX.

### *A1.1.3 Other software platforms*

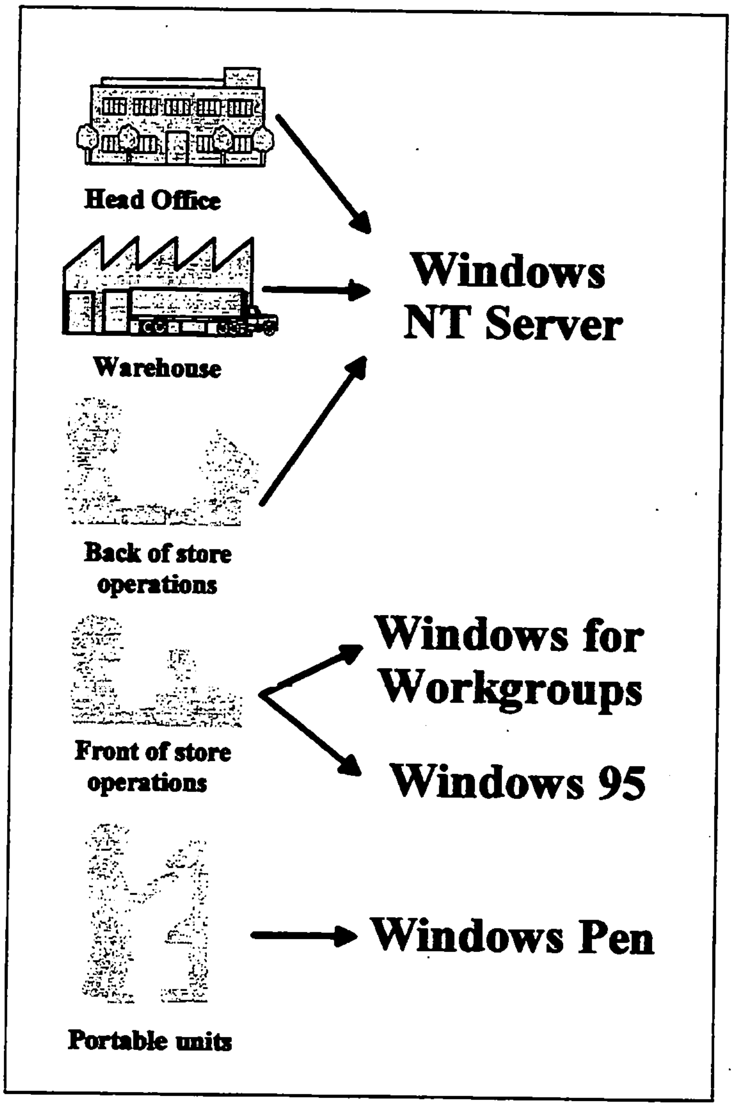
The most commonly found software platforms in food retailing are Windows (Microsoft), OS/400 and OS/2 (IBM). The Windows software has been continuously developed since the early 1980s. It started as Windows version 1 that was a basic Graphical User Interface (GUI) designed for non-expert users of computer systems. Since then it has evolved and currently used systems are Windows 3.1 (designed for 16 bit processors), and Windows 95 (designed for use on 32 bit processors). Both Windows versions are single user muti-tasking operations systems. Throughout the development of Windows the designers have taken great care to retain the user friendly image, and no doubt this has led to its popularity and position as the premier PC operating platform. In the food retailing environment Windows is almost exclusively used on the store user terminals. Windows 95 will almost certainly become the new standard for PC users and has several features that improve its usablility in the retailing environment. The most important of these features are it supports all of the commonly used network protocols (e.g. TCP/IP, IPX/SPX); and. improved management of the configuration files and systems parameters allows the control of access to applications software and terminal management (e.g. data polling) to be undertaken from a remote LAN manager.

Windows 3.1 and Windows 95 are in fact only a part of the Microsoft offering used by the retail sector. The limitation of these software platforms is that they have been optimised on the Intel processor and either work poorly on other proprietory processors, or will not work at all. To overcome this problem and to exploit the needs of the retail sector in 1994 Microsoft launched Windows NT and Windows for Workgroups. Windows NT is a family of multi-tasking client serving software platforms that will work on most hardware platforms . It also has a sofware applications development package based on the WIN32 API programing language. The Windows NT Server is a 32 bit mutli-tasking operating systems with centralised management tools for controlling the client-server network. This operating systems is configured to support the control of large RDBMS (Relational Database Management Systems - e.g. Oracle, Informix, Ingres, Progress, Sybase), message systems, systems management and host connectivity functions required by Head Office and Distribution systems. It also has good interconnectability with other software platforms and protocols, LANs and WANs or video applications. Windows for Workgroups (together with Windows 95) is designed for use on front of store operations such as the EPoS terminals. In essence it is Windows 3.11 that has been enhanced to include 32 bit disk access resulting in significantly faster response times in a LAN environment. It also supports Ethernet system connections and a full range of security management features to prevent unauthorised access to central store computers from the store workstations. As with Windows 3.1, Windows for Workgroup will only work on Intel based processors.

The final level in the Windows suite is called Pen Windows. This operating system is designed to work with the minimum of RAM (Random Access Memory) and disk capacity. It primary focus is on hand-held units used for stock taking and price checking / updating in stores however, it is also suitable for the control of a variety of other computer peripherals and office equipment (e.g. intelligent photocopiers, facsimile machines, printers). The use of these Microsoft packages is summarised in Figure A1.3.

The second type of operating systems commonly found in retailers are those developed by IBM. S/400 is a multi-tasking, multi-user operating system that is very like UNIX in structure and application. It was developed by IBM to operate on the IBM AS/400 minicomputer system - a popular hardware system in the retailing environment. The majority of applications that have been developed in the OS/400 environment use the IBM DB2 database and the 4GL programming language. IBM also developed a GUI called GUI400 to make the system more user friendly (and to some extent mimic the features of the Windows environment). The OS/400 operating system is being enhanced by IBM to become an 'open' system and reflect the general move in the retailing sector towards more flexible software and hardware configurations.

While OS/400 is used on the AS400 minicomputer and head office systems, OS/2 is used on the store applications. It is similar functionally to the Windows 95 software platform (which is hardly surprising as Microsoft and IBM jointly developed OS/2 until late 1992), and its GUI is similar to the familiar Windows program manager screen. The early version of OS/2 was a basic operating system package, but this was soon enhanced by IBM to include database management and communications software facilities. The most recent development of OS/2 is OS/2 Warp, version 3, that when coupled with AIX




**FigureA1.3 Windows operating systems structure**

(IBM's version of UNIX), provides a system that is slightly superior in performance to the Windows NT package (Savage, 1995). OS/2 Warp is a single-user, 32 bit multi-tasking environment. It contains many features that are desirable in the construction of a retailing system:

- a range of bundled software including an 'office' suite of wordprocessing, spreadsheet, presentation, small database, e-mail, multi-media and message system,
- communication software for Internet connection,

- the IBM LAN Manager system that works with the majority of the LAN protocols and will work with Novell Netware, Microsoft LAN Manager and SNA networks.

One area of distinct advantage that the IBM OS family of operating systems has over the Windows environment is the IBM inheritance of working with large systems. OS/2 for SMP (Symmetrical Multiple Processor) is available and will currently work with up to 16 multiple processors in the same system. Also the OS/400 (version 3) operating system is

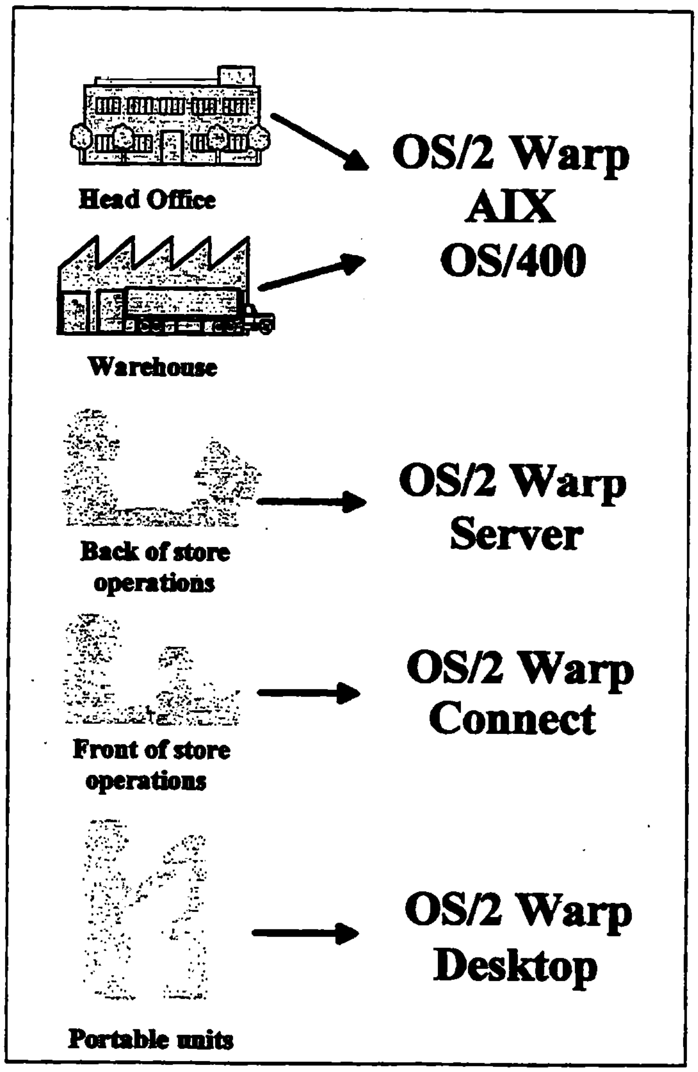



**Figure A1.4 The IBM OS operating system structure**

to some extent downward compatible and can use previously developed DB2 applications as well as other database applications developed in Oracle, Informix, Progress, and SQL Server. The use of these IBM systems is illustrated in Figure A1.4.

IBM clearly have a vested interest in retaining and enhancing their current customer base, and Microsoft are agressively trying to become the industry standard in operating systems. In the UK these operating system suppliers undoubtedly have the majority of the market. In the USA they do not have such a dominant position and are confronted by many more independent software systems designers who can survive and even thrive in a much larger market place. Being independent, designers who are working on the design of retailing applications tend to work using the 'standard' version of UNIX, POSIX. In doing so they avoid the problems of dialects and have established a wide variety of interchangable application packages. QNX and Novell are two products that claim to create a fault tolerant LAN operating system aimed at the store rather than the Head Office market. However, given the concentration of the food retailers in the UK, it seems unlikely that these other systems are likely to gain a significant foothold in the near future at least.

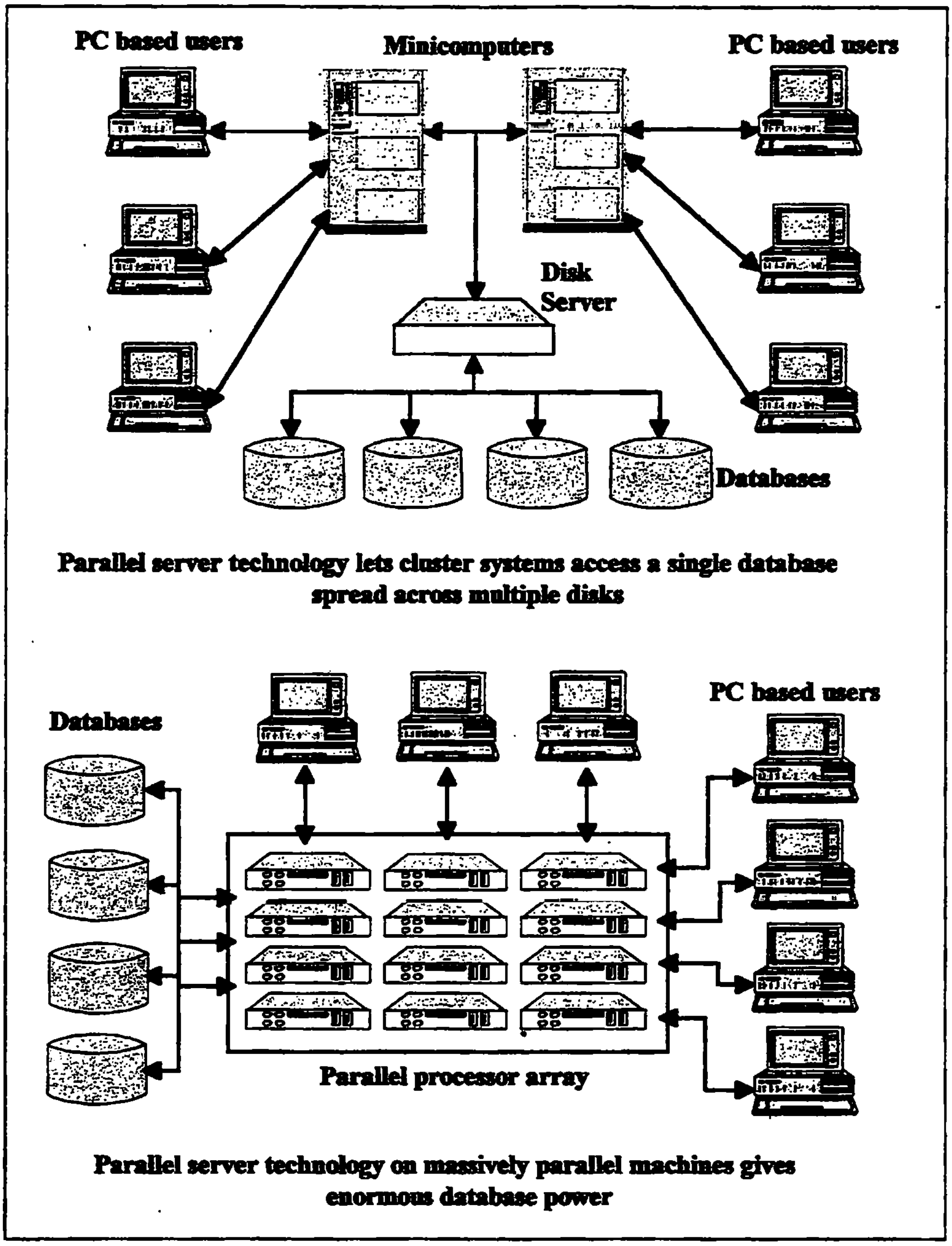
### *A1.1.4 Database systems*

Relational Database Management Systems (RDBMS) are the heart of food retailing information systems. In the retail store they hold information about the management functions and sales transactions; in the warehouse they hold information about receipts, deliveries, suppliers and stock location; in Head Office they provide information for all of the control functions of the business, for planning, for analysis, for reporting structures and for functional activities such as purchasing and merchandising. When they are connected through the LAN and WAN networks and the various hardware and software platforms a composite picture can be built up that enables accurate control of very large food retailing enterprises that have hundreds of stores, employ thousands of people, have ten of thousands of stock items and millions of pounds (sterling) worth of stock. Not unnaturally therefore, the development of RDBMS has been a critical part of the the development of food retailing Management Information Systems (MIS).

An RDBMS is a system in which data that is contained in different applications (e.g. the personnel attendance database and the personnel pay database), may be shared. The RDBMS is very flexible in nature and can be quickly adapted to changing needs and environments, new fields can be quickly added to existing data structures without compromising the data structure, and new applications quickly developed using a 4GL (fourth generation language) query language. 4GLs are high level languages (near English syntax) and programmes written in them are transportable and may be easily integrated with existing software packages. RDBMS are central to the functionality of UNIX systems. RDBMS have two basic configurations and these are illustrated in Figure A1.5.

In the upper half of Figure A1.5 the traditional RDBMS structure is illustrated. The PC based users (EPoS terminals or management system terminals) are connected via a LAN to the store minicomputers. In turn these access the main disk server technology and through this the disks. With this configuration the PC based users can access the relational database that may be spread throughout several physical disk drives, a configuration commonly found in Head Office systems. In an individual store it is unusual to find more than one disk drive. For large systems such as may be found in

Sainsburys, Tesco and Safeway, the mini computers would be replaced by a mainframe computer.




Source: Savage, 1995, p85

**Figure A1.5 RDBMS parallel technology configurations**

One of the great problems with this kind of systems configurations is that the response time of the system deteriorates as the databases get larger and as the number of users increases. To overcome this problem the system configuration shown in the lower half of Figure A1.5 has been developed. In this system the bottleneck imposed by single disk server and two minicomputers has been overcome by using parallel processor arrays (PPA). These PPAs allow rapid access to the RDBMS and this facilitates the very large database system (VLDBS) searches that are now being used to analyse the data gathered from historical sales (EPoS) and customer information. This kind of technology has already been developed for scientfic and defence research systems. These VLDBS may be terrabytes in size and require new data interrogation techniques. The PPA is likely to be the pattern of future large retail system development.

Whatever the configuration of future systems it is clear that current RDBMS must be capable of working under several operating systems. The most commonly found RDBMS packages in retailers are DB2 (IBM), SQL Server (Microsoft), Oracle 7, Informix and Progress. The compatability of these RDBMS and the operating systems is shown in Table A1.2.

| RDBMS | Windows NT | UNIX | OS/2 | OS/400 |
|---|---|---|---|---|
| DB2 | No | Yes | Yes | Yes |
| SQL Server | Yes | No | No | Yes |
| Oracle 7 | Yes | Yes | Yes | Yes |
| Informix | Yes | Yes | Yes | Yes |
| Progress | Yes | Yes | Yes | Yes |

Adapted from Storey, 1995, p84

**Table A1.2 Open Systems RDBMS compatibility**

In addition to open operating systems compatability many of these RDBMS have similar features. These would normally include -

- specification of files, fields and standards records for the creation of the database
- record updating with additional fields or field size changes
- relational file identifiers and associated index files for sorted records
- menu and screen layout templates and generator
- a report generator
- search and report facility for for exact match or embedded string (text or numeric)
- drill down facility for sequential key searches to refine the list of field matches
- a form generator
- an applications generator
- proprietary interpretive programming language (e.g. C++)
- compiler and linker for interpretive code
- proprietary 4GL with Structured Query Language (SQL) with a program debuger
- graphical spreadsheet for analysing the contents of the database
- import - export facility for record field exchange

In addition the RDBMS should have general environment features -

- direct LAN / WAN access (e.g. TCP / IP connectivity)
- fax and data communications software (e.g. e-mail)

- multi-media interfaces for graphical data processing
- fail safe features that allow the system to continue to operate if one part malfunctions
- access to a development library to avoid rewriting procedures
- direct linking to other RDBMS products
- utilities that enable access to and actuation of remote applications software
- a scheduler for routine data and system management tasks
- an access route to the UNIX operating system
- an upward migration path for old programmes
- an upward migration path for current programmes
- VLDB expandability and PPA access and compatability

Although these lists may seem long, the majority of the RDBMS have additional features that relate to the dialect of UNIX being used, the hardware platform being used and the system developer's previous experience. Much of the complexity in the retailing RDBMS stem from the need to use software structures that were developed during the 1980s. In time this complexity should give way to simpler more powerful systems with standardised software.

### *A1.1.5 The store hardware and software configuration*

The store has four quite distinct elements in its system. These are the back of store systems; the front of store systems; the mail and messaging system; and, the data communications system.

The back of store systems are -

- master data maintenance system
- report generation
- stock control (including raw materials for specialist functions such as bakeries)
- stock handling (including goods received, quality defect returns, excess stock returns, out-of-date returns and transferred stock)
- customer orders and accounts (many of the large stores will take special orders from customers for parties, etc.)
- local purchases (such as vegetables, flowers, specialist products)
- sales analysis and reporting
- financial control system (cash handling and banking)
- personnel systems (attendance register, productivity register, training register).

The front of store systems are -

- point of sale transaction records (working plus backup)
- point of service (unpackaged produce data, pharmacy records, cafeteria, cheque handling / printing system, etc.)
- EFTPoS (banking service link)
- promotion control (special offers, e.g. quantity pricing, deal reward, table pricing, etc.)
- customer relationship system ('loyalty' card administration, special 'loyalty' promotions

- hardware and software interfacing and miscellaneous systems

The electronic mail, messaging and data communication system are the elements that allows intelligence (in terms of internal memo's, letters, etc.) to circulate among those employed in the store, and data to flow between equipment within the store and between the store and Head Office. A typical hardware configuration is shown in Figure A1.6.

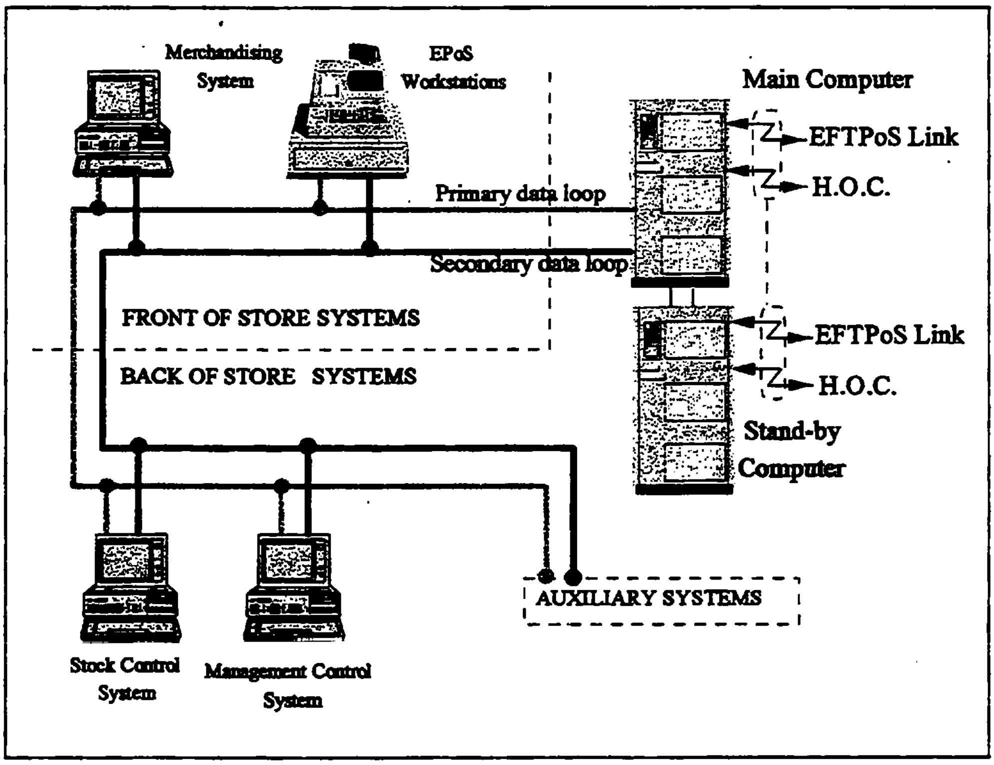



**Figure A1.6 Store hardware system layout**

This hardware configuration is designed to be robust. The two central store computers are connected back-to-back so that if one fails the other can take over immediately. This avoids loss of sales and control data that would be expensive and difficult to replace. As well as having two central store computers the wiring is also duplicated so that there is always more than one data route in case of accident. The external communication system is connected to the Head Office and EFTPoS systems. Each terminal (EPoS or PC) in the store is connected to both primary and secondary control loops using standard Ethernet connections. The auxiliary systems are usually associated with specialist functions within stores (e.g. pharmaceutical records, dry cleaning, butchery). The auxiliary system interface is often used to evaluate new technology or new approach to efficiency in the store (e.g. automatic shelf edge pricing system, customer scanning their own products). Eventually many of these auxiliary systems become subsumed into the standard system configuration. It should be noted that as computer technology has improved and become more reliable, the need for a second back-up store computer has diminished. Some modern systems now have only one computer at store level.

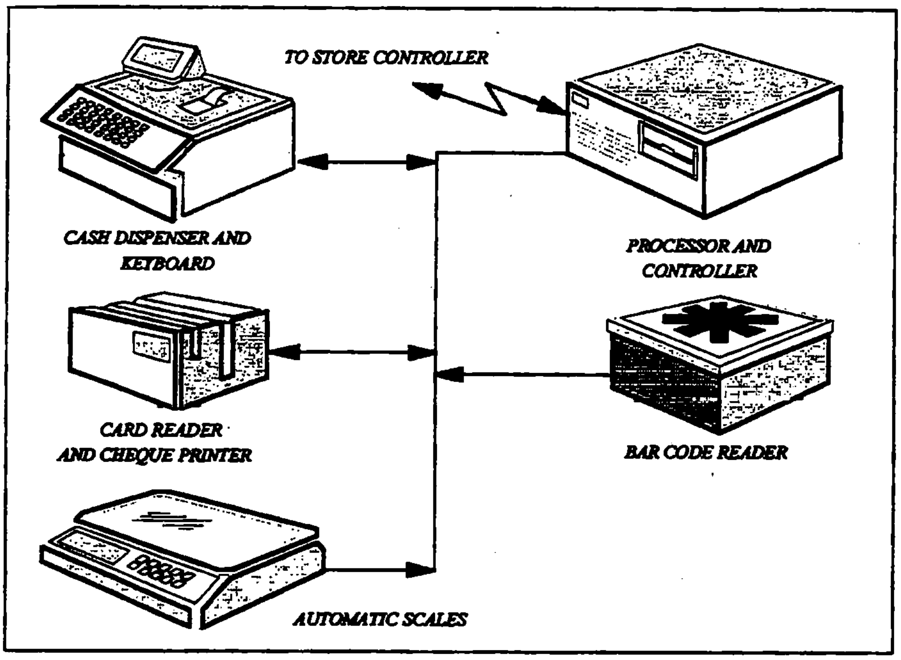



**Figure A1.7 EPoS workstation configuration**

In themselves the EPoS work stations are almost 'mini' computer systems. A typical system is illustrated in Figure A1.7. The core of the workstation is the processor and workstation controller. This contains a CPU unit, hard disc storage and Ethernet communications card. Each of the other functions (cash dispenser, card reader and cheque printer, automatic scales, bar code reader) are connected to the main controller through a standard interface card that plugs in to the processor mother board. The controller software contains a price information database that is regularly updated from the main computer. It also contains transaction data that is gathered throughout the day, stored and downloaded to the main computer for transmission to HOC at night. Other than these two functions most modern systems run independently of the main store computer for the majority of the day. As far as possible the check out functions are automated. However there are still many manual functions that have not as yet been eliminated - keying in pricing anomalies and discounts, dealing with spoiled bar codes, handling and weighing loose products (e.g. vegetables), 'swiping' the bar coded products through the checkout, swiping credit and debit cards and getting customers to authorise transactions, and helping to pack carrier bags.

The EPoS workstation is now the dominant customer / store interface technology. From the customer's point of view its advantages are obvious - faster service, quality of service, greater accuracy, improved system responsiveness and in the longer term these improvements will lead to lower prices for the consumer. From the retailer's point of view it provides accurate usage data and allows more precise merchandising, accurate replenishment data, accurate data for sales and trend analysis, and in conjunction with customer data gathered through store cards, data about the buying habits of different sectors of the buying public (Euromonitor, 1985). Since its introduction in the early 1980s its use in food retailing has grown rapidly, and it is estimated that by 1997 86% of all grocery sales will be across scanners. In 1993, 97.5 % of Tesco sales, 100% of Safeway sales and 99.7% of Sainsbury's sales were scanned (Nielsen, 1995).

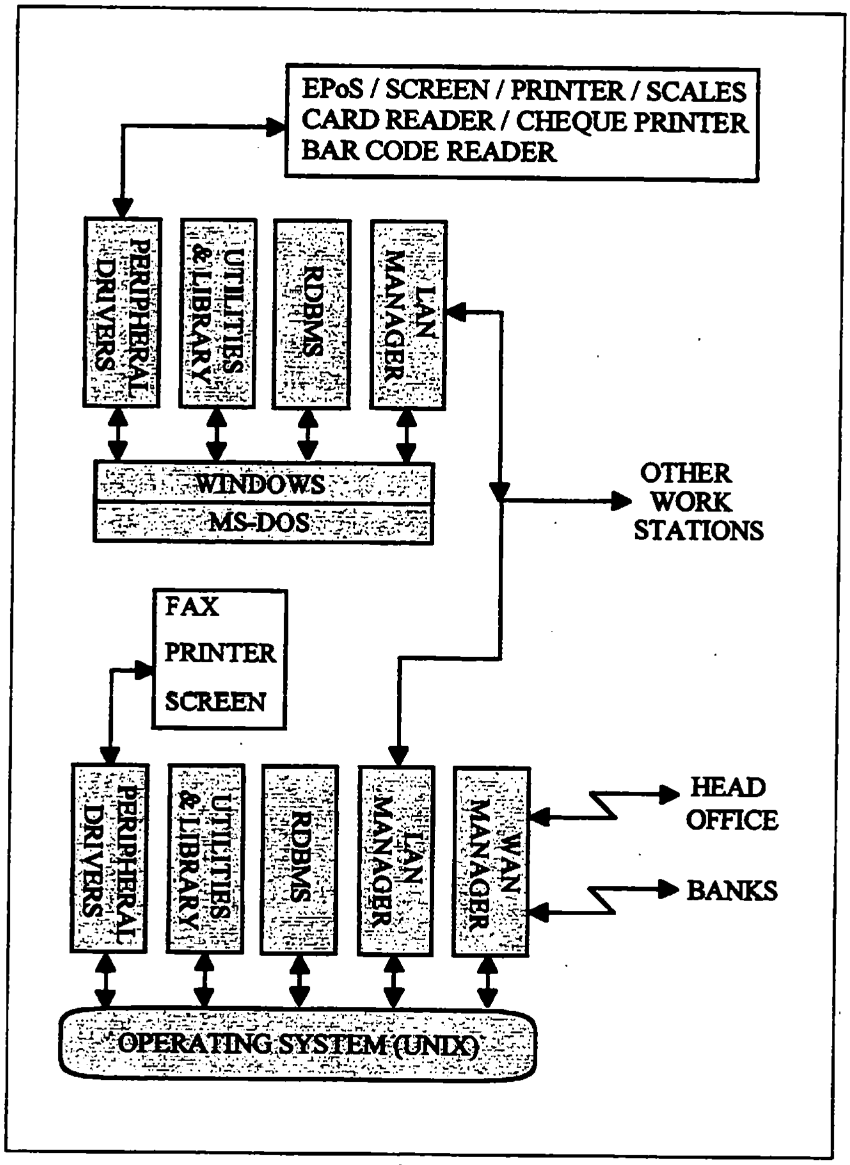



**Figure A1.8 Store software architecture**

The store software architecture (Figure A1.8) closely follows the pattern discussed earlier in this chapter with the main store computer having an operating system of UNIX (or UNIX-like) software as its base. This drives the system data interchanges through the LAN Manager. The external communications with the system are driven through the WAN Manager. The main RDBMS consolidates all of the data gathered from the system each day. On a busy day this can amount to a large amount of data (over 1.5 Gigabytes). The utility and library programmes perform the system housekeeping for the central computer, and remote housekeeping functions for the workstations. Communications with people are handled through the peripheral driver software. This sorts out the various software protocols that different hardware device sometimes need.

### *A1.1.6 The warehouse hardware and software configuration*

A vital part of the food retail system, and one which receives little academic attention, is the warehouse system. In part this is understandable as many of the large food retailers now subcontract this aspect of their operations to external organisations. In this case the warehouse is treated as another external supplier with only an EDI link required to register delivery and despatch data. However, a substantial number of the food multiples still have their own warehouse systems that are an integral part of the overall architecture of their system. A typical warehouse configuration is illustrated in Figure A1.9. Goods are delivered from suppliers and unloaded into goods inwards and inspection. The order is checked and compared with the delivery note to ensure that there are no shortages. Shortages are registered on the computer system and HOC is notified. A random sample of produce inspected to ensure it has been delivered to specification. Failure in inspection can mean immediate return to the supplier, or if the goods are not perishable put into quarantine until HO contact the supplier. Assuming the produce is acceptable it will be allocated a location in the store. This can be either a cold automatic store, a room temperature automatic store, a cold manual store or a room temperature manual store. If necessary produce will be bulk bar coded prior to transportation in to the store. This bar coding will include the store location, and this will be used in all subsequent transactions although PPA architecture is likely to form the basis of future systems. Broadly speaking the software structure follows the functional requirements of the business.

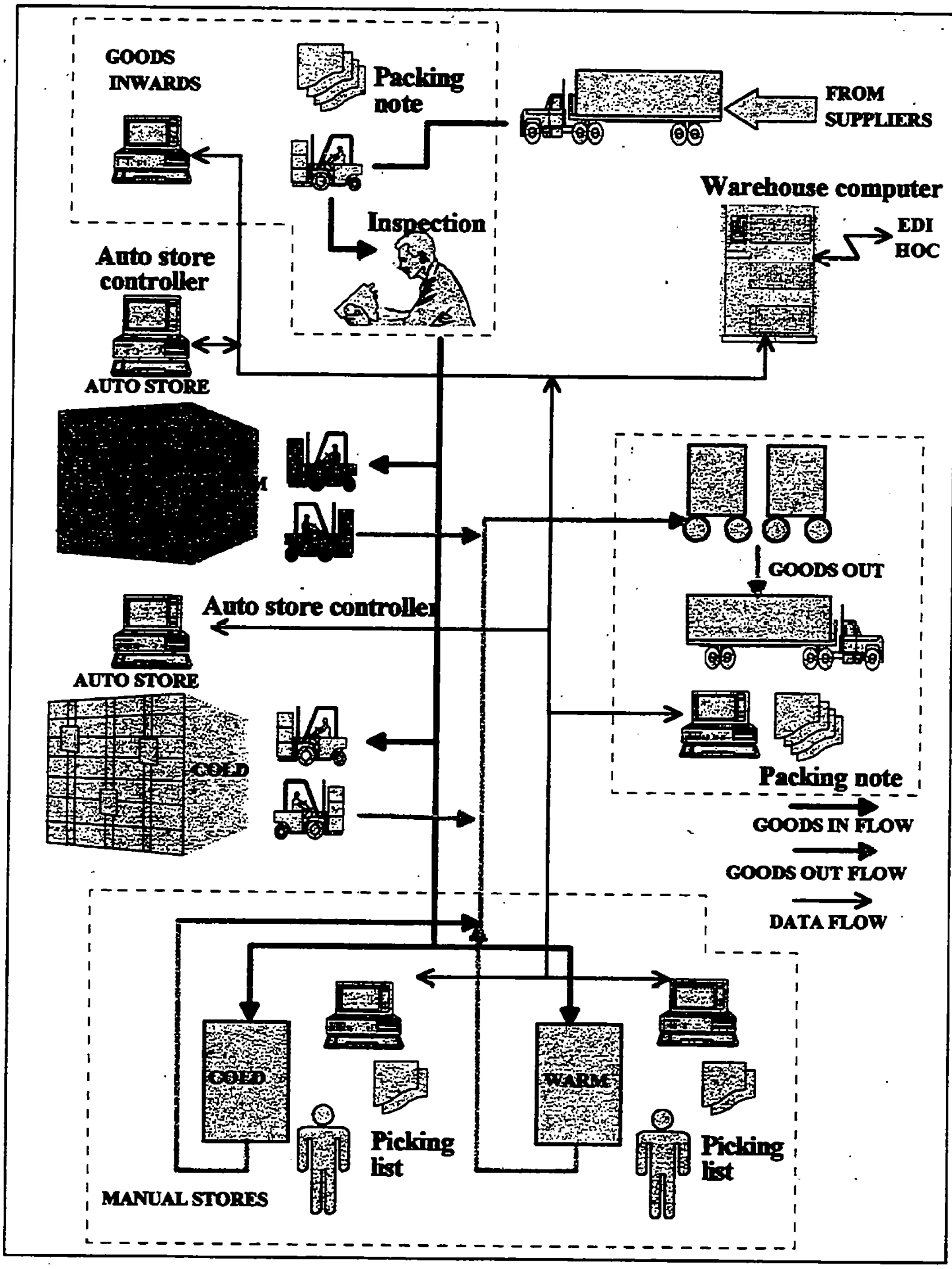



**Figure A1.9 Warehouse control system**

within the warehouse. Normally the warehouse control system allocates locations. When a stock order is required by a store it is generated by the HOC and sent to the warehouse computer via the EDI link. This order will then generate a picking list and this will be transmitted to the automatic and manual stores. The order is then assembled at goods out ready for loading onto the lorry and subsequent despatch to the stores. Before despatch the relevant paperwork is generated and passed on to the driver of the lorry. In some systems, where complicated routes and multi-deliveries are required, the computer may even generate a route plan. It should be noted that although this system is designed to be as automatic as possible, paperwork is still used at many of the human/computer interfaces and for audit trail purposes. The software architecture is very similar to that of the store (Figure A1.8). The main difference would be the inclusion of the automatic store controller as a separate sub-system and this may have a separate UNIX base of its' own. Even so, the data connection would still be established over an Ethernet LAN link.

### *A1.1.7 The Head Office hardware and software configuration*

At the hub of the retail control system lies the Head Office system. The role of this system is to co-ordinate the activities of the stores and distribution system, to monitor the financial activities of the organisation, to analyse the data gathered through the overall system and to provide intelligence to guide management decision making at a tactical and strategic level.With the wide range of functions performed by this aspect of the system, and with the daily need to process millions of transactions, it is hardly surprising that the Head Office computer system is large in size and high in processing power. Figure A1.10 illustrates a typical Head Office computer system structure. This system will be grafted on to a UNIX(or open system) software platform and be based on single large processor or PPA hardware platform. Historically the single large processor has been dominant, although PPA architecture is likely to form the basis of future systems. Broadly speaking the software structure follows the functional requirements of the business.

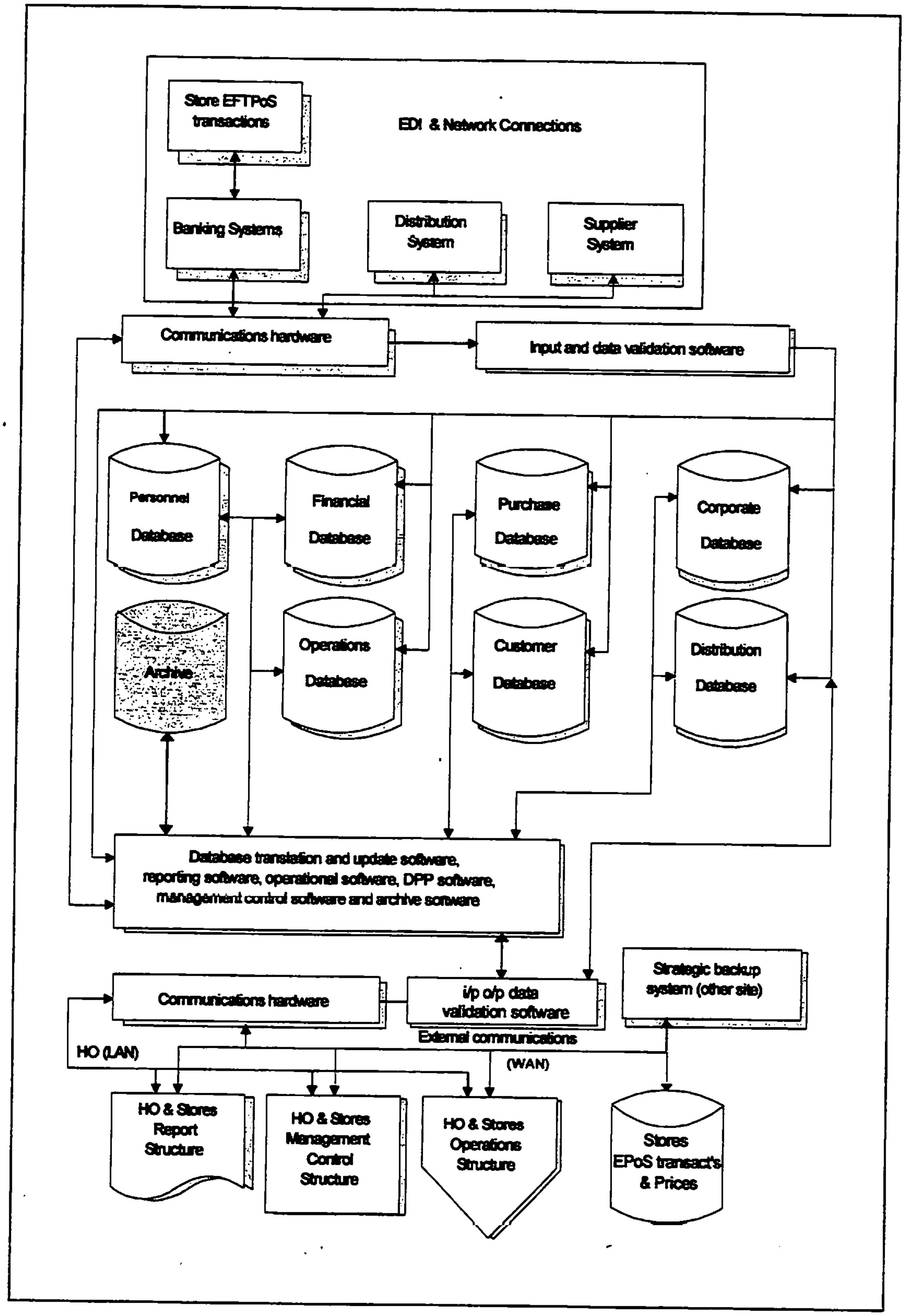



**Figure A1.10 Head Office control system**

The core of the software system is the RDBMS in which the data for the management control and reporting systems is stored. The data is normally partitioned (virtually if not physically) in the functional databases. Data access from external systems to these databases is checked and validated once it has been processed through the communications hardware / software system. Data egress to the external systems from the databases will be checked and processed to ensure the correct protocol is used to suit the system receiving the information. It is unusual for direct access or egress to take place from external systems because of the need to maintain data integrity within the system. The main software suite, containing database translation software, etc., will be under control of the IT department. They alone will be responsible for the maintenance and development of the hardware and software systems. This main suite supports the reporting and decision systems that HO users will access via the HO LAN, and store will access via the system WAN. Normally access restricted by a security system with various levels. The lowest level is read only, the highest level is complete access to the whole system. Very few people (even on the systems development staff) have access to the whole system. Two important features of the system are the archive database in which historical EPoS and trading information is kept, and the strategic back-up system. The archive database is used by the merchandising and customer service departments for trend analysis and customer behaviour analysis. The strategic back-up system automatically takes control of the system should the main system fail. As with the store, it is necessary to maintain system integrity and a main system failure could have a disastrous effect on the business as a whole. Most of the large food retailers consider they can recover from a systems failure within hours and maintain data integrity.

# *Appendix 2*

## *Retailer Case Histories*

### *A2.1 Introduction*

Considering the events that have surrounded the evolution of retailers in the past fifteen years it is difficult to be sure of the extent to which the large food multiples have been shaped by, or have shaped, the environment in which they operate. However, an understanding of the histories of Sainsbury, Tesco and Safeway gives some valuable insights into the dynamics of the organisations and provides a background against which to examine evolving food multiple strategies and the technologies they have used.

The following case histories have been compiled using a combination of existing historical data, interviews with senior executives either in or recently retired from the organisations, and from suppliers of technical equipment and systems to the food multiples. The first part of each case study is a brief history of the three organisations up to 1980 summarised in ten year periods. The second part of each case study examines events that took place between 1980 and 1990 - a period of great technological change.

## A2.2 J. Sainsbury plc

(Extracted from Williams, B., 1994, A History of Sainsbury's, Ebury Press, London and interviews with company executives.)

### *A2.2.1 The early years*

On the 12th June 1884 John James Sainsbury was born at 5 Oakley Street in Lambeth, London. He was the fourth and last child of Elizabeth and John Sainsbury. John Sainsbury Sr. was an ornament and picture frame maker. Little detail is known about the early life of John Sainsbury Jr. He took his first job at the age of fourteen with a grocer whose shop was near to Oakley Street in New Cut. After a while he moved to a new job with Henry Jeans, an oil and colour merchant of Green's End in Woolwich. In 1863 John Sainsbury Sr. died of pneumonia and shortly after in 1866 Elizabeth Sainsbury died of Tuberculosis. In spite of these events John Sainsbury Jr. seems to have learnt a lot about the retail business during his stay with Henry Jeans. Towards the end of the 1860's John Sainsbury moved to another oil and colour merchant, George Gillet, and it was there that he met his wife Mary Anne Staples. Mary Staples family were already owners of a small chain of dairy shops (later to become branches of Sainsbury's). At some time shortly before their marriage in 1869 John Sainsbury rented a small grocery shop at 173 Drury Lane, and with his savings of £100 set up in business.

### A2.2.2 1869 to 1880

On the 20th April 1869 James Sainsbury married Mary Anne Staples. They both worked in the grocery business in Drury Lane. Shortly after acquiring the shop John and Mary made a shrewd decision to convert their grocery shop to a dairy shop and were able to take advantage of the growing demand for dairy products. With a growing family the premises in Drury lane was becoming crowded and the couple moved to another shop at

159 Queen's Crescent in Kentish Town. They left a manager in charge of their original shop and concentrated on building up their new dairy shop. The new shop did well and by 1875 John Sainsbury was able to open a third shop four doors away from their existing shop in Queen's Crescent (no. 151). He extended his range of produce to cover imported Irish and Danish bacon. Once again Sainsbury seems to have judged the market well for by 1875 he bought yet another shop in Queen's Crescent, this time at number 94. It should be remembered that these shops were all small units (probably under 500 sq. ft.) and by having three in one locale Sainsbury was able to maximise sales and meet an established demand.

### A2.2.3 1880 to 1890

This period was one of steady growth for John Sainsbury. In 1881 he took over a cheesemonger's shop in Watney Street, Stepney. This shop had been previously owned by his brother-in-law Edward Staples. The produce (cheese and bacon) was mostly sold to the local dockers and lightermen. Two further Staples's shops were bought at Hoxton in North-east London, and in Chalton Street, St. Pancras. These acquisitions were not without challenge from other already established local traders. To avoid confrontation and the possibility of price wars Sainsbury often had to resort to subterfuge to hide his success. In one instance he bought a house that backed on to his shop so that he could have produce delivered without his opponents knowing. In 1882 Sainsbury acquired his first shop in Chapel Street, Islington. This was one of the first shops he was later to acquire from members of a 'retailer pact'. The pact was formed from several retailers in London and its purpose was to combine their buying power to gain additional discounts, avoid confrontation (competition) with existing members, and help each other to expand by offering premises on a first refusal basis to pact members. It was a kind of cartel based on related families or on families that had some form of close connection. By 1890 this pact represented between 70 and 80 shops and exercised considerable buying power. The arrangement worked well for Sainsbury and it was to be central to his expansion during the 1890's.

As his business grew Sainsbury had to improve the management of his stock, and in 1882 he obtained a warehouse in Allcroft Road near the three Kentish Town shops. This was rapidly converted into offices and storage areas. A part was even converted into a bacon smoking stove. He delivered the stored produce to his shops by horse drawn carts. At almost the same time Sainsbury acquired retail premises at London Road in growing town of Croydon. This was the first shop to open outside London. By 1890 Sainsbury owned 16 shops and employed approximately 180 people. He had expanded his produce range to include pork sausages, eggs, poultry in addition to the original dairy produce, and had broadened his geographical coverage to include Balham, Brondesbury and Lewisham. He had established this business on good quality products at reasonable prices.

### A2.2.4 1890 to 1900

Although Sainbury had grown considerably from his single shop in Drury lane during his 16 years of trading, he was acutely aware of the growing threat of the national food multiples of Home & Colonial, Liptons and the International Tea Company posed in 1890. They were all numerically larger and geographically widely based. Home and Colonial had over 100 shops. Thomas Lipton who started his business in 1885 in Glasgow already had 100 shops. The International Tea Company had over 200 shops. Sainsbury realised that these companies had been more successful at exploiting the expanding food supply that had resulted from the improved transport infrastructure and from food imports from the continent. Their size enabled them to pursue more aggressive purchasing strategies and also allowed them to trade profitably on lower margins with higher turnover.

To enable him to compete with this threat Sainsbury had to grow quickly. However, he was astute enough to realise that this growth would have to be accompanied by an improvement in company systems. On the 22nd July 1890 he took a lease on 11 Stamford Street, Blackfriars and on the adjoining building at 10-13 Bennet Street and converted these buildings into a new depot to replace the now inefficient Allcroft Road depot. This new depot was more centrally located in the London conurbation and was close to the major wholesale markets and rail termini. At the same time Sainsbury standardised his 'house style' in terms of shop presentation and organisation. He included ice boxes in his shops to extend the life of his dairy products and set stringent standards of cleanliness. By 1900 many of his shops had electric lighting installed and much of the new depot produce was delivered by steam powered lorries.

The company nearly trebled in size (to 47 shops) between 1890 and 1900 by consolidating their position in the London markets and by moving out into towns that were on good rail links with London. By 1900 Sainsbury was trading in Redhill, Ilford, Enfield, Ealing, Harrow and Watford. Williams (1995, p45) suggests that this limited growth was due to the wider range of products on offer to customers which in turn made the logistics more complicated and difficult to control. This may be true, but it is also likely that Sainsbury's own cautious nature and insistence on close managerial control had a great effect as well. This conservative pattern of growth can be observed throughout the lifetime of the company.

### A2.2.5 1900 to 1910

A process that began in the late 1880s and which continues to the present day was that of ensuring a consistent supply of fresh products to the shops. In part this was achieved by improving the methods of distributing produce from central storage. It was also achieved through control of the supply chain. Sainsbury was among the first food retailers to impose stringent quality controls on his suppliers and at all stages throughout the supply chain. All of these activities were focused on achieving consistency of quality in all aspects of the business. This attitude extended to the staff who were all employed on standards terms, conditions and work practices. These were 'policed' by the local inspectors.

The process of expansion had continued unabated. Building on a strong base in London, Sainsbury continued to buy premises in the home counties. In 1910 Sainsbury had 106 shops and was turning over £1.3m. The shops were a mixture of his traditional London shops, and what became known as 'country branches' in towns such as Brighton, Hove, Eastbourne, Bournemouth, Folkestone, Guilford, Ipswich, Tunbridge Wells and Oxford. This continued expansion presented severe problems in terms of produce distribution. The railways were inconsistent and were soon to be eliminated as a means of distribution to the outlying stores.

### A2.2.6 1910 to 1920

The four years before the First World War were ones in which Sainsbury's consolidated their position after a period of rapid growth. The distribution infrastructure that had been improved during the 1910s needed further improvement. Distribution of foodstuffs by rail was proving more and more problematical as delays of two to five days in delivery were not uncommon. This of course represented a serious problem for perishable products. Fortunately the road network was improving rapidly at this time and when new Daimler delivery lorries became available, Sainsbury's were among the first to use them. This switch from rail to road, completed by 1915, increased the choice of places to expand. By 1920 Sainsbury had 129 shops, a turnover of £5m and employed 2,800 people.

Sainsbury clearly had a great belief in management control systems. He had already established common terms and conditions for employees, standard store layouts and standards of food presentation, storage and hygiene. By 1914 Sainsbury had issued a 'Management Rule Book'. This book laid down the communications protocols for the organisation, training procedures (there was an apprenticeship to be served to become a shop assistant), and some practical hints on human resource and retail management.

The First World War proved to be great challenge to retailing in general. Once war had been declared panic buying ensued. The price of commonly used products soared, butter by 2d a pound, sugar from 1¾d to 4½d a pound and imported food supplies were threatened. This overall uncertainty generated many problems for food retailers as prices often fluctuated rapidly from one day to the next. To some extent Sainsbury's foresight in securing a good internal supply network for key commodities paid dividends. Initially food retailers imposed their own rationing system so that regular customers were served first. Eventually the government imposed general rationing.

Food supply was not the only problem that Sainsbury had to deal with. Once the war had started many Sainsbury employees volunteered to join the services. Others became conscripted as the war proceeded and took a terrible toll in human life. As Sainsbury was almost totally staffed by men before the War, the shortage of labour to run their stores soon became acute. It extended to all levels within the company structure. At first Sainsbury overcame the staff shortages by employing and training women as shop assistants. Often these women were the wives of the men who had worked for them. As the war continued it became necessary to employ women as managers of stores. By the end of the war there were thirty nine female store managers. In general, the war probably did more than anything else to break down the male oriented view of employers in the retail trade.

Once the armistice was signed demobilisation quickly took place and the returning men were quickly re-employed. However, many previous employees had been killed and their wives were retained in many stores. In fact several women managers were to keep their jobs for a considerable period of time after the war. Rationing was lifted in 1919 and the country returned to a more normal pattern of life.

**A2.2.7 1920 to 1930**

The war had had a profound effect on the UK economy. After a short post war boom a severe recession followed leaving many people out of work. In an attempt to improve the economy the Government took protectionist measures to try to reduce the massive trade deficit. The pre-war free trade atmosphere was abandoned and Ramsay MacDonald introduced subsidies for home produced foods and quotas that favoured Empire produce. From Sainsbury's point of view this was good news as most of their produce was sourced within the UK. The same was not true for their competitors who relied to a greater extent on imported produce.

In 1922 Sainsbury's became a private limited company. John James (the founder) became Governing Chairman, John, Arthur and Alfred all became directors. The company was valued at £1.3m, but as the company remained privately owned Sainsbury had the freedom to continue to plough his profits back into the company. On the 3rd June 1928 John James Sainsbury died and all of the company's shops closed as a mark of respect and to allow employees to join the funeral procession from Stamford House to Putney Vale cemetery.

**A2.2.8 1930 to 1940**

The restrictive economical conditions continued to favour Sainsbury's during the 1930s. Williams (1995, p74) point out that by 1934 bacon quotas alone were costing Sainsbury's competitors £150,000. To add to these overall problems many of the old food retail shops were now in need of replacement or refurbishment. This problem affected all food retailers and at this point in time many food retailing shops were little larger than a conventional terraced house. For Sainsbury's competitors this factor was to be crucial as refurbishment costs were very high. In 1934 Home & Colonial had 798 shops, Lipton's had 449 shops and Maypole Dairies had 977 shops. At this point in time Sainsbury's had some 225 stores many of which were reasonably modern. The relatively slow expansion rate of Sainsbury's meant that they had less to refurbish than their competitors and consequently more to invest in new properties. They continued to expand throughout the 1930's and by the end of this period were established in the Midlands, East Anglia and the South.

By 1939 Sainsbury's were outperforming many of their rivals on a much smaller trading base (Sainsbury's turnover was £12.5m on a 225 store base, Home & Colonial's turnover was £9.9m on a 798 store base). Sainsbury's stores were all arranged in a standard format. Each store had dairy, bacon & ham, poultry and game, cooked meats, fresh meat and groceries departments. Sainsbury's own brands were well established in all departments, their use placed leverage under brand manufacturers to be competitive in pricing. The number of products sold had risen from 5 in 1870 to 600 in 1939, the number of employees risen from 2 in 1870 to 8500 in 1939.

**A2.2.9 1940 to 1950**

When WW2 had been declared many of the male employees of Sainsbury's were in the conscription age range. The company quickly reacted and contacted all female ex-employees who had been previously trained by Sainsbury saying that a job was waiting for them. While considerable numbers of women returned there was still a considerable shortfall that could only be overcome by a more general recruitment. This had to be done as a matter of urgency so that training could be done while the original staff were still on hand to complete the training. As expected, the male staff were soon leaving to join the armed forces and throughout WW2 the company continued to fight with the problems of staff shortages.

Inevitably rationing came with the War and families were required to register with their normal retailer. The large number of migrations around the country, especially away from London, required a large bureaucratic effort on behalf of companies like Sainsbury's. While the majority of other staff were moved away from Stamford Street, the staff who co-ordinated the rationing bureaucracy and the repair teams for bombed stores remained. Rationing was in fact a very complex process as not everything was rationed in the same way at the same time. Compounding this complexity was the fact that many people were illiterate or semiliterate and had to rely on shop staff to help them to get their ration cards sorted out. Distribution channels became disrupted as roads and railways were bombed - again causing more work for the staff of Sainsbury's. There is no doubt that WW2 imposed severe problems on the company. At one time the company almost went bankrupt as the costs associated with training, premises repair, and paying for working longer working hours could not be offset by increasing turnover.

**A2.2.10 1950 to 1960**

At the end of 1949 Alan Sainsbury visited America to study the changes that had taken place in food retailing. He was impressed with the supermarket self-service format and with the large open plan stores. In 1950 the first of the modern format stores was piloted at Selsdon. This store was used to try out different ideas that became standard in future stores (the first of the modern stores was built at Croydon and had a floor space of 3,300 sq. ft.). These ideas included updating the company's facia, using refrigerated cabinets for meat and dairy products, innovating in packaging, fluorescent lighting, using perspex instead of glass, self service, and improvements in hygiene methods. Product innovations were to have to wait until rationing was lifted and normal trading with the outside world was resumed.

During the following five years more were converted to the self-service format. Wherever possible new stores were purpose built to the new format. This process continued slowly until Sainsbury opened the largest self-service store in Europe in Lewisham (7500 sq.ft.) in 1955. During the late 1950's the pattern was one of building new stores rather than refurbishing old stores. By 1960 Sainsbury's had 256 stores (compared with 244 in 1950) and employed 15,000 people. Turnover had risen to £68m (compared to £15.8m in 1950) and the average number of stock items had risen to 2000.

**A2.2.11 1960 to 1970**

This was a period of infrastructure modernisation for Sainsbury's. The distribution of produce was decentralised and warehouses in Bruntingford, Basingstoke, Hoddesdon, and Charlton were opened. Sainsbury's became the first retailer to co-ordinate stock operations at Head Office with an EMIDEC 1100 computer. Over 1000 own brand products were introduced during decade and by 1970, 4000 different products were sold in their stores. In 1961 many non-food items such as kitchenware, cleaning requisites and toiletries were introduced. In 1963 Sainsbury's became the first to sell wines and spirits in their supermarkets. The company also continued to experiment with new methods of packing produce and new packaging materials to improve handling within the stores and the distribution chain.

Throughout decade smaller stores were either replaced or extended and the average store size rose from 539 sq.ft. in 1960 to 948 sq.ft. in 1970. However, the total number of stores dropped from 256 to 225. The EMIDEC computer was replaced by a much larger ICL 1906E to keep pace with changes in the company. This period was also one of management change as several non-family directors were appointed.

**A2.2.12 1970 to 1980**

In 1973 Sainsbury became a public limited company. 10,000,000 shares in the company were sold to the public, institutional investors and employees. Most of the money raised from this flotation was earmarked for future expansion.

In spite of the vagaries of the economy Sainsbury trading performance improved during this period. Turnover rose from £187.5m in 1960 to £1226.6m in 1980. The key focus of this decade was efficiency improvement. Computer systems were enhanced to improve ordering performance and extended to other aspects of the company, for example merchandising and planning. Innovation at store level included Plessey data capture units to replace manual stock check techniques and product innovation continued as delicatessens, in-store bakeries, petrol stations, freezer centres and wines were introduced.

In the late 1970s the first of the price wars took place. Sainsbury's response to the Tesco price reduction challenge was to reduce over 100 items by up to 15% in price. It was a battle that was to fought again and again in years to come - each time with a negative effect on company profits.

Early in the 1970s Sainsbury began to seriously consider diversification. Its dominant market position in food retailing was being constantly challenged by Tesco et al and the company wanted to broaden it's market base. The company was cash rich and the possibility of buying out a major competitor was considered. However, Sainsbury thought that a broader portfolio was a more appropriate format for the future. In 1975 Sainsbury formed a joint venture with BHS to form Savacentre - a hypermarket based composite retailer. In 1979 Sainsbury formed a second joint venture, with Belgian retailer GIB, to form Homebase.

By 1980 Sainsbury had 231 stores with an average size of 17,700 sq.ft. It's turnover was £1226.6m, it had 37,300 staff and it sold 7000 items.

**A2.2.13 1980 to 1990**

The end of the 1970s saw the company growing considerably in terms of complexity. The supply chain was growing rapidly in complexity due to the continued expansion of the product range and the move away from manufacturers delivering directly to the stores. The number of suppliers was increasing and the customers demand for fresh produce such as salad vegetables throughout the year meant that many of these suppliers were overseas companies. Because of these international sources the company (and other food multiples) had a virtual summer throughout the year. The stores were also increasing in size and sophistication. The change from the traditional small/medium sized high street store was picking up momentum as larger sites became available on the edge of cities and towns and the planning regulations were relaxed.

Sainsbury were ideally placed for growth as they entered 1980 with a large cash reserve that had been retained from the flotation in the mid 1970s. They had a good customer profile with high customer loyalty, an experienced management team lead by David Sainsbury, and strong financial performance (Sainsbury gross margin was 3.66% compared to Tesco 2.32%). Between 1980 and 1990 turnover increased from £1227m to £7257m; gross margin from £45m to £471m; the number of stores increased from 231 to 420; and their share of the food market rose from 6.2% to 9.6% (Source: Company

Reports and Accounts). However, this growth was to tempered by the traditional need for control and efficiency, and these are themes that recur consistently through the 1980s.

In technological terms the move into the 1980s presented several challenges. Although Sainsbury had been the first retailer to buy a mainframe in the 1960s the functional use of the system had been restricted to isolated subsystems that supported manual performed management activities. For example the purchasing system was co-ordinated by the computer but orders were still placed manually. By the end of the 1970s it was becoming evident that the manual systems could not cope with the increase in complexity and volumes. Gradually the isolated head office systems began to be merged into integrated suites of programs and many of the manual systems were automated. These changes improved efficiency in functional terms and also reduced the armies of clerks that ran the old manual system. The other fronts on which technology began to make an impact was the distribution depot and at the store.

In the distribution system the underlying problem that Sainsbury faced was one of control. By the early 1980s computer technology was beginning to become cheaper and it became a practical and cost effective proposition to have quite a powerful computer at each distribution node. However, to make this computer effective the capture of data about the progress of produce through the system had to be automated. For this to be done accurately produce had to be bar coded at several levels - in the packing case, in the pack multiples and on each individual product. Initially problems were encountered because of different bar code standards, but once the EAN (European Article Numbering) system became universally adopted these problems disappeared. The transition from manual systems, to semi-automatic, to automatic systems was more or less complete by 1985. The other issue that had a big impact on the distribution systems was the automation of communications between the head office computer and the distribution computers. Once this became reliable it was possible for the purchasing function to accurately know what stock was in the system on a day by day basis, previously this had varied from a week by week to a month by month basis, and in turn this helped to reduce the stock levels through more accurate ordering. These developments were taking place at a time when Sainsbury was moving away from owning their own distribution system to a partially subcontracted distribution system. This policy was adopted as a result of an extended drivers strike at the Hoddesdon, Bruntingford and Basingstoke depots that began in June 1977 and which lasted several months. During the strike Sainsbury had to resort to using subcontract distributors to supply the stores. However, the internal bitterness caused by this episode and the effectiveness of the subcontract system, caused Sainsbury to revoke a previously held view that they should control the whole of their system. As a consequence during the 1980s the growth in the distribution system was not based on Sainsbury owned units but on the use of subcontractors. By the end of the 1980s Sainsbury even shared distributors with other food multiples. Without the computer based control systems and computer based communications these developments would not have been possible.

While the depots and warehouses systems were developing similar progress was being made in the stores. The challenge at the store was to collect transaction information and to pass this on to the central systems. While Sainsbury knew what went into the systems, and broadly speaking where it was at any given time, once produce went into the store the information train stopped. Exactly what was in the store at any point in time, what was and what was not selling, was still a mystery to the buyers. As a result much of the merchandising was unfocused, and the stock lines a store carried took little account of local tastes and demand patterns. Wastage was high at the store level and stock turns slow. Of course these problems became more acute as the number of product lines increased. Sainsbury approached this problem in two ways. In the late 1970s, because of the inconsistency of product labels, they introduced bar code scanning of shelf edge labels. This was not particularly popular with the store staff as they were required to haul around a large scanning unit about the size of a suit case, scan the shelf edge with a wand and then enter product/stock level information into the unit by hand. Whatever the inconvenience of these units at least allowed the company to develop the systems for store data capture and the data was accurate to within a day or two. In time these hand scanning units became smaller (the Psion scanner), and these smaller units are still used during stock checks. The second approach to the problem was to use EPoS at the check out. Initially when EPoS was introduced in 1980 it was a half way house between manual checkouts and automated checkouts. The data gathered by the EPoS terminal was only used for cash management purposes. The products that couldn't be scanned had to have their codes manually entered. This was difficult for the check-out operator as she or he often had to remember hundreds of product codes. Again this was a transient phase and by 1985 it was possible to scan nearly all of the store lines at the check out.

The great value of the EPoS terminal was that in addition to providing cash management information at the check-out, when processed the same data could be used for stock control purposes. By polling this data overnight Sainsbury's gained an accurate knowledge of stock movements and improved the ordering system efficiency, effectively closing the information loop. Through this system the average stock turn increased from about 8 weeks at the beginning of the 1980s to between 4 and 5 weeks by the end of the 1980s.

The other technological innovation introduced by Sainsbury in 1988 was EFTPoS (Electronic Funds Transfer to Point of Sale). This move was prompted by the increasing use of plastic credit and debit cards by the public. The banks had encouraged the use of the cards as a way of reducing their own cash handling costs and increasing security. It soon became widely adopted by the retailers for broadly the same reasons. The EFTPoS system operated through the central store computer and the head office central computer to the banks central clearing computers. These activities are described in detail in Chapter 4 and Appendix 1.

The 1980s was a decade of applying technology for J. Sainsbury. Throughout his period, in addition to the specific technical innovations mentioned above, the head office systems were being integrated and continually enlarged. The need to maintain control throughout the Sainsbury empire and to be as efficient as their opponents drove these developments. By the end of the decade Sainsbury had moved from a predominately manual run business to a business completely dependent upon computers and technology.

The history of Sainsbury's is really a history of retailing in recent times. They have been dominated by one family who appear to retain the founder's trading sense throughout three generations. They have maintained their market position and growth by keeping the needs of their customers clearly in view. They have innovated in all aspects of their business while keeping focus on the two key variables in any business - quality and liquidity.

Table A2.1 is a brief summary of Sainsbury's history.

| Year [1] | Number of branches | Tunover £m | New store average sales area (sq. ft.) | Approx. number of products sold | Number of employees | number of customer visits ('000s) |
|---|---|---|---|---|---|---|
| 1870 | 1 | - | 500* | 5[2] | 2[3] | - |
| 1880 | 3 | - | 500* | 10* | 9* | - |
| 1890 | 16 | - | 1,000* | 50* | 180* | - |
| 1900 | 47 | - | 1,000* | 130 | 950* | - |
| 1910 | 109 | 2.4[4] | 1,000* | 200 | 2,000* | - |
| 1920 | 124 | 5 | 1,500* | 400 | 2,800 | 25[5] |
| 1930 | 189 | 9.9 | 1,750* | 500 | 6,500 | - |
| 1940 | 249 | 12 | 2,000* | 600 | 8,500 | 250[6] |
| 1950 | 244 | 15.8 | 2,000* | 550 | 8,500 | - |
| 1960 | 256 | 68 | 5,800 | 2,000 | 15,000 | 1,000* |
| 1970 | 225 | 187.5 | 10,200 | 4,000 | 32,000 | 2,000* |
| 1980 | 231 | 1226.6 | 14,800 | 7,000 | 37,300 | 4,000 |
| 1990 | 291 | 5644.8 | 32,300 | 14,000 | 75,500 | 6,750 |
| 1994 | 341 | 8864.6 | 30,200 | 19,000 | 93,500 | 8,000 |

(Source: Williams, B., 1995, p 219)

**Table A2.1 Sainbury's key statistics, 1870 to 1994**

Notes: * Sainsbury's estimates

[1] All figures relate to Sainsbury's financial year, exclusive of subsidiaries.

[2] Based on 3 products - butter, milk and eggs

[3] Two members of the Sainsbury family

[4] Figures relate to 1912, the earliest year for which records are available

[5] Based on 1912 reference to serving 10,000 customers daily

[6] Number of customers holding accounts with Sainsbury's in 1939

## A2.3 Tesco plc

(This has been compiled from interviews with managers and executives, from extracts of a company publication entitled 'The Growth of the Tesco Organisation' and company reports and accounts.)

### A2.3.1 The early years

Jack Cohen left the Royal Flying Corps in 1919 at the age of 21 with a gratuity of £30 and found himself looking for a job in a Britain with over 3 million people unemployed. Faced with almost certain unemployment he took a gamble and used his gratuity to buy some NAAFI surplus stock. This he sold at a local market in Hackney. On his first day of trading he sold £4 worth of goods and made £1 profit. With typical entrepreneurial flair Cohen was soon selling goods at six local markets on different days of the week. In one of his transactions he managed to buy some tea from an importer called T. E. Stockwell. However, before he could sell it on the market stall he had to think of a brand name. Cohen added the first two letters of his own name to the initials of the tea supplier and the name Tesco was created. This name stays with the company to date and it was Tesco tea that was Cohen's most successful line in the early days.

### A3.2.1 1920 - 30

Having gained a foothold in local market trading Cohen quickly added a small distribution operation selling a small range of wholesale products (including tea) to his fellow market traders. Although details of this period in Cohen's life are limited, it is clear that he must have been quite successful for by 1928 he was considering the problems of moving from his market trading base to high street shops. In 1929 Cohen acquired his first leasehold lock-up shop at Burnt Oak, Edgware in North London and the name Tesco Stores Ltd. was registered. At that point in time the traditional way of selling products was essentially one of auction and the trader sold the customer what he wanted to sell. Cohen realised from his experience in open markets that customers preferred to choose their own produce and so he experimented by arranging his shops with the produce laid out on counters. In the week he made the change to the new layout his turnover doubled from £150 to £300.

### A2.3.2 1930 - 40

Throughout the 1930's Cohen rode the wave of population growth that was occurring in London. Building on the success of his first shop format, he bought and opened shops throughout the London suburbs. He astutely acquired the freehold of many premises - a sound inflation proof investment for the future. In 1934 (in a similar way to Sainsbury's during their early development) Cohen acquired the freehold of a plot of land at Angel Road, Edmonton in North London and built a new headquarters and warehouse. This warehouse was vital for the efficient distribution of food to the companies 48 stores. The warehouse also gave Cohen an opportunity to develop some of the ideas he had been working on to improve stock control.

Cohen's success continued throughout the 1930s and by 1939 he owned 100 stores. These were situated in prominent positions on the High Streets of North London forming a substantial retailing chain turning over £2m a year. However, this success was overshadowed by the war the country was about to be plunged into.

### A2.3.3 1940 - 1950

In common with other retailers, the Second World War slowed Tesco expansion prospects for several years. At first Cohen had to concentrate on repairing damaged premises and later he found that profitability (from which he funded his acquisitions) was restricted due to a general lack of produce to sell. Rationing and restricted food supplies meant that the price of fresh vegetables soared, and with an eye to a business opportunity Cohen extended his operations into production. He bought land in Chesunt with extensive glasshouses and pasturage. From this investment was able supply his own shops with fresh vegetable and fruit when other supplies were limited or unavailable. This was the first and last venture that Cohen made into primary production. It was not profitable and production was abandoned after the War although the company kept the site which subsequently became the it's headquarters.

Immediately after the War Cohen visited the USA and came back enthused with the idea of self-service shops (as did John Sainsbury). He even ran a pilot scheme at a converted shop in St Albans. It was a limited success for the time it ran, but restricted supplies prevented full exploitation of the idea. By 1949 the supply of food had eased and Cohen repeated the experiment, this time with great success. Self service proved to be the pattern for future multiple shopping formats and all subsequent Tesco stores were designed with this in mind. This method of shopping also helped Tesco to contain costs in a period of high wage inflation. By the end of 1950 Tesco had 68 self service stores.

### A2.3.4 1950 - 60

The Cohen philosophy of "pile it high, sell it cheap" proved to a formula for success in the 1950s. Post War austerity was relaxing and people had money to spend. Cohen was committed to growth and large sums of money were spent each year on larger and more modern stores. By the end of the decade a new Tesco store opened every 5 weeks. However, the London market was becoming saturated and sites increasingly difficult to find. Cohen realised that if he was to compete with the other large multiples he would have to grow even larger, but he wished to keep within his London distribution area if possible. The only way this could be achieved was to buy other smaller retail chains. In the mid 1950s Tesco acquired a chain of 18 Burnards Stores in London and a controlling interest in Williamson Ltd. with a further 70 grocery, hardware stores and restaurants was acquired.

**A2.3.5 1960 - 70**

This decade was marked by a significant growth in non-food consumer spending. Tesco followed this trend and in 1961 opened the largest store in Europe (at that time) on the outskirts of Leicester. Over half of the 16,500 sq.ft. was devoted to non-food products. This move was significant in two respects. The first was that of a commitment to diversification, and the second was the move away from London into the home counties. In fact the move out of London was in part due to the lack of sites within the conurbation for the larger stores. Throughout the 1960s the acquisitions continued as Tesco pushed further North. They concentrated on existing food retail chains but did occasionally consider other food businesses that could form part of the supply chain for the main stores (see Cadena below). In 1960 they bought John Irwin & Sons in the North West (200 grocery shops), in 1964 Charles Phillips & Co. (97 self-serve grocery shops), in 1965 Cadena Cafes (66 cake shops, bakeries and restaurants) and Adsega (32 Northern supermarkets). But the most ambitious take-over of all took place in 1967 when Tesco's acquired the Victor Value chain with over 280 stores. By the end of this decade Tesco owned 834 stores making them numerically the fourth largest grocery chain in the UK after the Co-op, Fine Fare and Allied Suppliers. In 1965 the company administration and distribution network was reinforced when it opened a large office and warehouse in Winslow in Cheshire and in 1969 Cohen was awarded a Knighthood for his services to retailing.

**A2.3.6 1970 - 80**

The trend towards larger stores continued throughout this period. Most of the new super and hyper stores were edge of town developments. Land on these developments was cheap and local authorities were happy to build roads and provide services to attract the stores.

During this period Retail Price Maintenance (RPM), a system whereby suppliers fixed the minimum price for their goods, was still in force and this prevented retailers from offering the public lower prices. For multiples like Sainsbury who sold a large amount of 'own produce' this law had a limited effect. Traders like Tesco, who bought and sold most of their produce on the open market, found RPM very constraining. Trading tactics among the large retail chains largely revolved around ways of avoiding RPM. Tesco and other food multiples (with the exception of Sainsbury) used Green Shield Stamps as a way of effectively discounting food. However, this was an expensive operation to maintain and as soon as RPM was abolished in 1964 Tesco began aggressive price cutting. This action sparked what has now become known as price wars.

The 1970s saw quite significant changes to the company infrastructure. In 1973 after 55 years of controlling Tesco Cohen retired and handed over to Leslie Porter who marked his appointment by opening a head office extension at Chesunt and a new Home 'n' Wear warehouse in Milton Keynes. In 1976 a new fresh food processing and packaging plant was opened in Ashton under Lyme. In its time it was one of the most advanced plants in

Europe. In 1977 Tesco upgraded their first computer system, an ICT 1300 bought in 1966, to an IBM 3033 and in 1980 this computing power was supplemented with an IBM 4341. 1978 saw the acquisition of Cartiers Superfoods of Kent (16 stores) and the first major expansion of Tesco south of the Thames.

**A2.3.7 1980 to 90**

Throughout the 1950s and 1960s Tesco had grown through acquisition, and although in 1980 they had the largest number of stores of any food multiple (552 compared with Sainsbury's 231), they were not as profitable as many of their competitors. The reasons for this lack of profitability lay in the number of small centre of town stores they continued to operate. At the start of the 1980s it was clear that the trend in store format was away from the small town centre store towards the large edge of town store. Tesco disposed of over 200 of their smaller stores between 1980 and 1987 and rationalised their structure around the edge of town format. This is not to suggest that acquisitions ceased, far from it. In 1982 Tesco bought Catteau, a French supermarket business based in the Nord-Pas de Calais region (92 food stores).

Because of the speed of this restructuring it was inevitable that Tesco were slower than Sainsbury in developing the powerful central control systems that underwrote Sainsbury's superior profit performance. It should be pointed out that Tesco had similar technology to Sainsbury at the start of the 1980s, and they had also experimented with EPoS, but the cost of rolling out the centralised control philosophy to the proliferation of small stores was prohibitive. Instead they concentrated the technological innovation on the new large stores as and when they were commissioned. This meant that it took quite a long time to replace the manual systems at head office - a further drain on profitability.

Another issue that was important in the evolution of Tesco during the 1980s was that of management culture. The change began in 1984 when Ian MacLaurin was appointed as Chairman. He sought to establish a more progressive management style based on modern control systems. Up to the late 1970s, because of the variety of store size and configuration that Tesco operated with, and because of the relatively underdeveloped central systems, Tesco allowed their store managers a great deal of freedom in store layout, pricing and stock control. Up to this point in time it was the only practical approach to be taken at the store level even though guidance as to minimum pricing, merchandising and stock control were given by head office. Culturally they were a very different company from Sainsbury who had always been subject to strict centralised control. But if Tesco were to cope with the ever increasing number of product lines, reassert the strong central control MacLaurin perceived it needed and not drown in inventory, it needed very a different approach. However, until a universal measuring and control mechanism could be imposed on their stores such a move could not be contemplated. Just such an opportunity presented itself when EPoS technology unlocked the links between store stock control, accurate central purchasing and efficient management of the stock in the supply system. Tesco had been watching Sainsbury's efforts during their introduction of EPoS led systems integration and began to develop their own systems. Shortly after Sainsbury began to implement their integrated system Tesco followed. By the time Sainsbury had completed their roll out in 1987 Tesco were only a year behind. In 1987 the company began using TRADANET which allows electronic linking to suppliers. By giving their suppliers more accurate information Tesco reduced ordering time, out-of- stocks and wastage. Once these processes were complete the foundations of the old managerial attitudes were eroded, and by end of the 1980s the whole of the Tesco system was under a central control system.

The history of Tesco, like that of Sainsbury, is dominated by one man. Shortly before Cohen died he said: " The lesson that I learned in the early days of my career still apply today, no matter how much society changes: in good times and bad, the company that works hard, that insists on offering value for money, and is not afraid to experiment and make changes, will always prosper."

While the official history stresses the gains and progress the company made, it has also made some fairly major mistakes and once or twice required major surgery at board level. (The whole episode when Daisy Hyams ran the company has been omitted from the official history.) The sanitised version has been written by the survivors in much the same way that history is rewritten by the victorious.

## A 2.4 Safeway plc (The Argyll Group)

(This has been compiled from interviews, two company documents - 'Safeway Company History' and 'Company History of the Argyll Group', and Clarke-Hill and Robson's Argyll Group Case Study in McGolrick 1994)

### A2.4.1 The early years

Of the three case studies examined in this research the Argyll / Safeway is the most complex. There are two strands to the Safeway history. The first begins in the UK in 1962 when Safeway Stores inc. of the USA decided to expand into the UK market. They acquired 8 supermarkets and a warehouse from J. Gardner Ltd. and formed the company of Gardner and Prideaux Ltd. When the stores of Gardner and Prideaux were subsequently converted to the American store format, they traded under the name of Safeway.

The second strand of the history is that of the Argyll Group. The Argyll Group can be traced back to 1971 when James Gulliver, Alistair Grant and David Webster formed a company called Oriel Foods who manufactured foodstuffs for retailers. Oriel Foods attracted the attention of the RCA Corporation and was bought out in 1974. Gulliver, Grant and Webster remained with RCA until 1977. They then left to form the base of what is now known as Argyll Group plc with money that was retained from the original RCA take over. In 1987 the Argyll Group bought Safeway from its American owners. At this point the two strands join and continue as the story of the Argyll Group.

### A2.4.2 Safeway 1962 - 70

Building on the previously mentioned Gardner & Prideaux chain it acquired in 1962, Safeway opened their first 'own built' store in 1963 in Bedford. At 20,000 sq.ft. it was the largest supermarket in Britain and was modelled on the American format of wide aisles, large chiller units and self-service fruit and vegetables. In 1965, Safeway opened their first store in Scotland. By 1969 Safeway were turning over £20m but were still a small player in the UK food retail market.

### A2.4.3 Safeway 1970 - 80

A new distribution centre was opened in Aylesford and within a year this was enhanced to include a new meat preparation plant. Terry Spratt was appointed Chairman in 1975 having worked with the company since 1962. By 1980 the company was employing over 8,000 people and profits were approaching £10m.

### A2.4.4 Safeway / Argyll 1980 - 94

In 1982 Safeway employed 10,000 people and profits were £20m. They had also opened their 100th store. In 1985 the company began a modernisation programme by implementing scanning technology in it's stores (EPoS). By 1987 Safeway had 86 store in London and the South, 25 stores in the Midlands and the North, and 22 stores in Scotland.

On February 27th 1987 Argyll bought Safeway for £681m and acquired 133 stores and with them about 3.4% of the UK food retail market. Considering that Safeway were turning over in excess of £1b at this time, it was a cheap purchase. In 1987, 7 large Presto stores (the trading name of stores Argyll already owned) were converted to the

Safeway format and showed an increase in profits of more than 75%. The process of conversion of Presto stores continues throughout 1988 and by the end of the financial year 176 were operating under the Safeway banner. By the end of 1988 Safeway had opened its largest store ever in Sutton (50,000 sq.ft.) and had over 200 stores in total.

At this point in time the separate identity of Safeway became rather blurred. The majority of stores owned by the Argyll Group operated under the Safeway banner. However the group produced consolidated accounts and it is not possible to separate Safeway trading performance from the Argyll Groups published figures. However, the Safeway identity was a strong one in the market place and the store management implemented significant improvements in the application of technology, in environmental issues, in equal opportunities and in a series of social initiatives that resulted in several prestigious awards.

**A2.4.5 Argyll Group plc 1978 - 1980**

In 1978 the Argyll team took over the loss making food distributor and retailer Morgan Edwards Ltd. of Shrewsbury. They rationalised Morgan Edwards operations by closing many of their Supavalu stores, revising discounting policies, and improving financial control systems. At the same time Argyll took over a small food retailer called Paddys, based in the North Midlands. These two companies formed the basis of the Argyll Group plc.

In 1979 another highly geared loss making company, Louis Edwards & Sons (Manchester), a meat-processing and wholesaling company with retail butcher shops, was taken over and subject to the same rationalisation process as Morgan Edwards. In this year the Argyll Group also acquired two successful biscuit manufacturers, Yorkshire Biscuits and Furniss & Co. for £3m.

In 1980 Argyll Group (through Louis Edward & Sons) took over Cordon Bleu with 46 freezer centre outlets in the north-west Midlands and Dalgetty Frozen Foods with 33 freezer outlets in the south east. Their penetration of the freezer centre market was consolidated when they bought Freezer Fare and Bonnimart adding another 51 outlets. All of these freezer centres were integrated to work under the name of Cordon Bleu. Argyll then merged the Morgan- Edwards and Louis Edwards companies to form the Argyll Group. The biscuits interest was enlarged with the acquisition of Patersons Shortbreads.

**A2.4.6 1981 to 1994**

During 1981 Oriel Foods was reacquired from the RCA Corporation for a price of £19.5m and with it came Lo Cost Discount Stores, Mojo Cash and Carry and Snowking Frozen Foods - a good fit with the growing Argyll portfolio. Total Argyll Group sales reached £100m. In September Argyll took a 20% stake in Linfood Holdings (now known as Gateway) who had sales of over £1b. In an attempt to increase its share holding in Linfood Argyll fell foul of a monopoly commission enquiry and subsequently withdrew from the acquisition. In 1982 Argyll acquired Allied Suppliers for £101m raising money through a share issue. Allied Suppliers, owned by Cavenham, was an old company that had been created through various amalgamations including those of Home & Colonial, Lipton, Maypole Dairies, Galbraith and Templeton. (All of these companies played a significant role in the evolution of British retailing and in one way or another have influenced the evolution of Sainsbury's and Tesco.) This gave the Argyll Group a critical mass in the food multiple market place. They had 128 Presto Stores and 795 other stores which came as a part of the Allied take-over, and a total sales revenue of £847m.

In the early 1980s Argyll began to think seriously about buying into the U.S. retail market and as a first step bought Barton Brands of Chicago. Barton operated in the liquor trade. This was an uneasy relationship and within 3 years Argyll sold off Barton and concentrated on their UK grocery retailing business. In 1984 Argyll extended their retail grocery influence by taking over Hintons, a family owned supermarket chain that operated in the North East of England.

By 1985 the Argyll group had a very wide portfolio of companies trading under many different names. They decided to rationalise their trading facia. At the beginning of the year the Group had Presto, Liptons, Templeton, Galbraith, and Hintons facias. Argyll reduced these to Presto, the firms principle large shop trading identity, and Lo-Cost for all small shops. This process took about 2 years to complete. However, Presto and Lo-Cost had a middle to low end of the market image and Argyll now wished to acquire an up-market trading group.

In 1987 Argyll bought Safeway Stores Ltd., a subsidiary of Safeway Stores Inc., for £651m. Safeway operated at the quality end of the retail market and had a reputation for good management and innovation. At the time of the take-over Safeway had a wide geographical coverage and was ranked 6th in the UK retail league. Argyll found the Safeway trading was more profitable than either Presto or Lo-Cost, and within 6 months of the take-over Argyll announced that Safeway would become the principle retail identity. In making this move Argyll were repositioning themselves in the retail market, directly challenging Sainsbury and Tesco. In 1988 Alistair Grant became Chairman of the Argyll Group.

In late 1989, early 1990 Argyll formed an Alliance with Casino of France and Ahold of the Netherlands. Having had a bad experience with the USA market they were cautious about acquiring companies in the EC. This Alliance was called the European Retail Alliance (ERA) and through it Argyll improved purchasing power. ERA was soon to link to the Associated Marketing Services (AMS) which also had links to a further 9 affiliated members. The combined membership of AMS represents about 11% of the total EC food market with over 13,000 retail outlets and 130,000,000 customers.

Throughout the evolution of the Argyll Group prior to the Safeway acquisition the technology strategy had little structure or form. The key focus of the systems was financial control backing up tight management practice. The systems that were in use were not integrated. To a greater extent Argyll allowed the individual store chains to continue to use their own purchase and stock control systems. However, once the Safeway take over had been completed and the Argyll Group management had an opportunity to see how professionally it had been managed, it became obvious that it made sense to standardise on the systems they were using. As the various groups gradually became merged into the Safeway trading format so their individual systems were replaced with the Safeway control system. While this systems was quite substantial at the time of the Argyll take-over in the late 1980s, it was expanded in the early 1990s and could be considered to be similar in size to that of Sainsbury and Tesco.

In two respects the development of the Safeway system was different from that of the Sainsbury and Tesco systems. It was the first to standardise on OSA (Open Systems

Architecture), and the first to move away from the BOS (Batch Operating System) to OLS (On Line Systems). It seems most likely that the OSA move was needed because of the wide variety of different systems that had to be integrated due to the way in which Argyll expanded. OSA would have permitted this integration with the least cost (it would have minimised the cost of program conversion). The explanation of the use of OLS is more problematical. It seems likely that the tight financial control exercised by the Group executives could only be achieved through the use of OLS. (It should be pointed out that this is conjecture and has not been substantiated.) Whatever the real reasons for these developments what is certain is that it created a very flexible system upon which the subsequent growth of Safeway has been built. Functionally, the Safeway system performed the same functions as the Sainsbury and Tesco systems.

In 1997 the Argyll Group changed their trading name to Safeway plc. Their consolidated 1994 balance sheet posted a turnover of £6,000m and a profit of £365k. This gave them about 6% of the retail market in the UK, placing them third in the retail pecking order. It is clear that market saturation in the UK is causing them to look abroad, and the press are constantly hinting at acquisitions in Europe. The only way they can grow within the UK would be to acquire another large food or drinks group. However, this would cause duplication of geographical coverage and it is difficult to see how this is likely to increase the performance of the Group.

# *Bibliography*

Adburgham, A., *Shops and Shopping, 1800 - 1914*, Allen &Unwin, London, 1964

Airey, C., *Superstore Analysis in the UK*, IGD Research Services, Letchmore Heath, UK, 1993

Alchian, A.A., *Uncertainty, evolution and economic theory*, Journal of Political Economy, Vol. 58, 1950, pp. 211-221

Alexander, M, in Schorr, J., Alexander, M., Franco, R.J. (eds), *Logistics in Marketing*, Pitman, London, 1969

Alexander, N., Hine, J., Howells, J., *EFTPoS, Before and After: Retailer Reaction*, International Journal of Retail & Distribution Management, Vol.19, No. 5, 1991, pp. 10-16

Anon., *Focus on Europe's largest composite store*, Industrial Handling and Storage, Sept. 1991, pp. 15-17

Anon., *Keeping the customer satisfied*, Infomatics, April 1993, pp. 51-53

Annual Abstract of Statistics, HMSO, London, 1990-95

Ansoff, H.I., *Corporate Strategy*, Penguin, Harmondsworth, 1965

Ansoff, H.I., *The Evolution of Corporate Planning*, Working Paper, G.S.I.A., Carnegie Mellon Univ., 1967

Argyll Group plc, Reports & Accounts 1990 - 1997

Argyris, C., Schon, D., *Organisational Learning: a Theory of Action Perspective*, Addison Wesley, N.Y., 1978

Armistead, C.G., *Customer Service and Operations Management*, Service Industries Journal, Vol. 9, No. 8, 1989

Armistead, C.G., *Service Operations Strategy: Framework for Matching the Service Operations Task and Service Delivery System*, IJISM, Vol. 1, No. 2, 1994, pp. 6-16

Artle, R., Berglund, S., *A Note on Manufacturers Choice of Distribution Channels*, Management Science, Vol. 5, 1959, pp. 460-471

Asch, D., *Readings in Strategic Management*, Macmillan, London, 1989

Atkin, R., *Supply Chain Management: To Maximise Resourse Usage and Maximise Service*, BPICS Control Journal, June/July, 1993, pp. 25-28

Babbage, C., *On the Economy of Machinery and Manufacturers*, London, 1832, pp. 10-11

Bailey, P., Farmer, D., *Purchasing Principles and Management (6th edn.)*, Pitman, London, 1993

Baker, C., Personal interview, 20th October 1993, Tape code JS:CB1:10:93

Baker, C., Personal interview, 13th January 1994a, Tape code JS:CB2:01:94

Baker, C., Personal interview,11th February 1994b, Tape code JS:CB3:02:94

Ballou, R.H., *Basic Business Logistics*, Prentice Hall, Englewood Cliffs, 1978

Bamfield, J.A.N., *The changing face of British retailing*, National Westminster Bank Quarterly Review, May, pp. 33-45, 1980

Bamfield, J.A.N., *Technological Management Learning: The Adoption of EDI by Retailers*, 7th Int. Conf. on Research in the Distribution Trades, University of Stirling, 1993

Barker, R.C., *Value-adding performance measurement: A time based approach*, IJOPM, Vol. 13, No. 5, 1996, pp. 33-40

Barnes, S., Dadomo, S., Turner, D., *Grocery Retailing 1997: The Market Review*, IGD, Letchworth, 1997

Barney, J., *Strategic Factor Markets: Expectations, Luck and Business Strategy*, Management Science, October, 1986, pp. 1231-1241

Barrett-Brown, R., *Power and Work Systems*, Allen Unwin, London, 1968

Barty-King, H., *Making Provision: A Centenary History of the Provision Trade*, Quiller, London, 1986

Bate, P., *Strategies for Cultural Change*, Butterworth Heinemann, London, 1996

Becker, T.M., Meyers, P.R., *Empathy and bravado: Interviewing reluctant bureaucrats*, Public Opinion Quarterly, Vol.. 38, 1974, pp. 605-613

Bell, P.C., *Emerging technology to improve managerial productivity*, Business Quarterly, Vol. 5, No. 4, 1985/86, Winter

Bennis, W., Nanus, B., *Leaders: The strategy for taking charge*, Harper & Row, NY, 1985

Benson, J., Shaw,G., (eds), *The Evolution of Retail Systems c 1800 - 1914*, Leicester University Press, Leicester, 1992

Bird, J., *Looking After the Shop*, Management Today, Nov., 1993, pp. 78-82

Birn, R., Hague, P., Vangelder, P., *A Handbook of Market Research*, Routledge, Kegan & Paul, London, 1990

Board of Trade, *UK Retail Analysis*, HMSO, London, 1995

Boatman, J., *Quality in Retail Distribution*, Publisher and date unknown.

Bogdan, R.C., Biklen, S.K., *Qualitative Research in Education: An Introduction to Theory and Methods (2nd edn.)*, Allyn & Bacon, Boston, 1992

Bowersox, D.J., Closs, D.J., *Logistical Management*, McGraw-Hill, NY, 1996

Bowman, C., *The Essence of Strategic Management*, Prentice Hall, Hemel Hempstead, UK, 1990

Bowman, E.H., Hurry, D., *Strategy through the Option Lens: An Integrated View of Resource Investment and the Incremental-Choice Process*, Academy of Management Review, Vol. 18, No. 14, 1993, pp. 760-782

Boyacigiller, N., Adler, N., *The parochial dinosaur: organisation science in a global context*, Academy of Management Review, Vol. 16, No. 2, 1991, pp. 262-290

Brady, T., et al, *Strategic IT issues: the view of some major investors*, Journal of Strategic Information Systems, Vol. 1, No. 4, 1992, pp. 183 - 189

Bracewell, R., et al, *Never underestimate the value of a database*, European Management Journal, March, 1992, pp 56-58

Braverman, H., *Labour and Monopoly Capital: The Degredation of Work in the Twentieth Century*, Monthly Review Press, NY, 1974

Briggs, A., *A Social History of England (2nd edn)*, Penguin, London, 1991

Brookes, R., *Recent Changes in the Retailing of Fresh Produce: Strategic Implications for Fresh Produce Suppliers*, Journal of Business Research, Vol. 32, 1995, pp. 149-161

Bromley, R.D.F., Thomas, C.J., *Retail Change: Contemporary Issues*, UCL Press, London, 1993

Brown, M., et al, *Transport & Distribution*, Management Today, April, 1994, pp. 79-90

Brown, M.B., *The Controllers of British Industry.* in Coates, K., *Can the Workers Run British Industry?*, Sphere, London, 1968

Brown, W., Ebsworth, R., Terry, W., *Factors Shaping Shop Steward Organisation in Great Britain*, B.J.I.R., XVI, July 1978

Bryman, A., *Research Methods and Organisational Studies*, Routledge, London, 1992

Buckingham, C., *Tracking Sales: Latest best practice in electronic capture*, ADMAP, June 1991, pp. 26-30

Buckingham, C., *New Capabilities: The revolution in continuous marketing research, and why it's happening*, ADMAP, Oct. 1992, pp. 32-34

Burke, G., Peppard, J., *Examining Business Process Re-engineering: Current Perspectives and Future Directions*, Kogan Page, London, 1995

Burns, T., *Industry in a New Age*, New Society, January, No. 18, 1963

Buxton, G., *Effective Marketing Logistics*, Macmillan, London, 1975

Cadbury Bros., *Industrial Record: A Review of the Interwar Years*, Bournville, 1945

Cannon, T., *Patterns of Innovation and Development in the Food Chain*, British Food Journal, Vol. 94, No. 6, 1992, pp.10-16

Cardwell, M., *Customer Care Strategies for the 1990's*, Pitman, London, 1991

Carter, H., Lewis, C.R., *An Urban Geography of England and Wales in the nineteenth century*, Edward Arnoly, London, 1990, p. 54

Champey, J.A., *Re-engineering Management*, Harper Business Press, NY, 1995

Chandler, A.D., *Strategy and Structure: Chapters in the History of the American Industrial Enterprise*, MIT Press, Cambridge, Mass., 1962

Childe, S., *Managerial Strategies, new technology and the labour process*. In Knights, D., Wilmott, H., Collinson, D., (eds) *Job Redesign: Critical Perspectives on the Labour Process*, Gower, Aldershot, 1985, pp 374-383

Childe, S.J., Maull, R.S., *A Framework for Understanding Business Process Reengineering*, University of Plymouth, 1994

Christopher, M.C., Schary, P.B., Skjøtt - Larsen, T., *Customer Service and Distribution Strategy*, Associated Business Press, London, 1979

Clarke, J., McLoughlin, I., Rose, H., King, R., *The Process of Technological Change: New Technology and Social Choice in the Workplace*, Cambridge University Press, Cambridge, 1988

Clegg, H.A., *The System of Industrial Relations in Great Britain*, Blackwell, Oxford, 1972

Clegg, H.A., *The Changing System of Industrial Relations In Great Britain*, Blackwell, Oxford, 1979

Cleveland, G., Schroeder, R.G., Anderson, J.C., *A Theory of Production Competence*, Decision Sciences, Vol. 20, 1989, pp. 655-668

Conger, J.A., Kanungo, R.N., *Towards a behavioural theory of charismatic leadership in organisational settings*, Academy of Management Review, Vol. 12, No. 4, 1987, pp. 637-747

Cook, J., *Serving up Good Systems*, International Journal of Retail & Distribution Management, Vol. 20, No. 4, 1992, pp. 35-36

Coombs, R., *Automation, management strategies and labour process change*. In Knight, D., Wilmott, H., Collins, D., (eds), Job Redesign, Critical Perspectives on the Labour Process, Gower, Aldershot, UK, 1985, pp. 142-70

Cooper, J., (ed.), *Logistics and Distribution Planning: Planning Strategies for Management (2nd edn)*, Kogan Page, London, 1994

Cooper, L., *Location - Allocation Problems*, Operational Research, Vol.11, 1963, pp. 331-343

Cooper, R., Kaplan, R., *How Cost Accounting Systematically Distorts Product Costs*, in, Bruns, W.J. (ed), Accounting Management, Field Study Perspectives, HU Busines Presss, Boston, Mass., 1987

Corbett, C., Wassenhove, L., *Trade Off's - What Trade Off's: Competence and Competitiveness in Manufacturing Strategy*, California Management Review, Vol. 35, No. 4, Summer, 1993, pp.107-122

Corley, T.A.B., *Quaker Enterprise in Biscuits: Huntley and Palmer of Reading*, Hutchinson, London, 1972

Cox, R., Brttain, P., *Retail Management*, Pitman, London, 1991

Coyle, J.J., et al, *The Management of Business Logistics (5th edn.)*, West, St. Paul, 1992

Crossfield, R.T., Dale, B.G., *Developing the customer supplier interface through bar coding*. International Journal of Vehicle Design, Vol. 12, No. 3, 1991, pp. 276-283

Curry, B., Moutinho, L., *Computer Models for Site Location Decisions*, International Journal of Retail & Distribution Management, Vol. 20, No. 4, 1996, pp. 12 - 17

Cutler, K., Rowe, C, *Scanning in the supermarket: for better or worse? A case study in introducing electronic point of sale*, Behaviour and Information Technology, Vol. 9, No. 2., 1990, pp. 157-169

Cyert, R.M., March, J.G., *A Behavioural Theory of the Firm*, Prentice Hall, Englewood Cliffs, NJ, 1963

Davenport, T.H., *Process Innovation: Reengineering Work Through Process Information Technology*, Harvard Business School Press, Boston, Mass., 1993

Davidson, R.W., Doody, A.F., *Retail Management*, Ronald Press, 1966

Davies, G., Brookes, J.M., *Positioning Strategy in Retailing*, Paul Chapman, London, 1989

Davies, G., *Patterns in Cross Shopping for Groceries and their Implications for Co-operation in Retail Location*, British Journal of Management, Vol. 4, 1993, pp. 91-101

Davis, D., *A History of Shopping*, Routledge, Kegan & Paul, London, 1966

Dawson, J.A., *Commercial Distribution in Europe*, Croom - Helm, London, 1982

Dawson, J.A., Shaw, S.A., in Fernie, J., (ed), *Retail Distribution Management: A Strategic Guide to Development and Trends*, Kogan Page, London, 1990

Dawson, S., Wedderburn, D., in Woodward, J., *Industrial Organisation: Theory and Practice (2nd edn.)*, Oxford University Press, Oxford, 1980

Denzin, N.K., *The Research Act: A Theoretical Introduction to Research Methods*, McGraw-Hill, NY, 1978

Dibb, S., *Marketing: Concepts and Strategies*, Houghton Miffin, London , 1994

Dobler, D.W., Burt, D.N., Lamar Jr. L., *Purchasing and Material Management (5th edn.)*, McGraw-Hill, NY, 1990

Dobler, D.W., Burt, D.N., *Purchasing and Supply Management (6th edn.)*, McGraw-Hill, NY, 1996

Dove, J., Personal interview, 14th October 1994, Tape code TE:JD:10:94

Dove, J., Personal interview,10th February 1995a, Tape code TE:JD:02:95

Dove, J., Personal interview, 23rd June 1995b, Tape code TE:JD:06:95

Drucker, P.F., *The Economy's Dark Continent*, Fortune, Vol. 103, April, 1962, pp. 265-270

Duke, R.C., *European New Entry into UK Grocery Retailing*, International Journal of Retail & Distribution Management, Vol. 21, No. 1, 1993, pp. 35-39

Economist, October 8th 1994, *Pyrrhus at the Check-out*, p. 104

Economist, October 29th 1994, *The emporia strikes back*, pp. 113-114

Economist, November 19th 1994, *Furnishing the world*, pp. 101-102

Economist, November 26th 1994, *Down the line*, pp. 104-107

Economist, January 21st 1995, *Kmart, Retail Therapy*, p. 78

Economist Intelligence Unit, *Cash and Carry Wholesaling*, Retail Business, No. 274, London, 1980

Elger, A., Smith, C., (eds.), *Global Japanisation? The transnational transformation of the labour process*, Routledge, London, 1994

Emery, F.E., Trist, E.L., *Socio Economic Systems* in Churchman, C.W., Verhulst, M., Management Science, Models and Techniques, Vol. 2, Pergamon, London, 1946

England, F, Personal interview, 7th June 1995a, Tape code IB:FE1:06:95

England, F., Personal interview, 21st September 1995b, Tape code IB:FE:09:95

Eva, M., *SSADM Version 4: A Users Guide*, McGraw-Hill, London, 1992

Evans, P, Personal interview, 19th March 1993, Tape code IC:PE1:03:93

Evans, P., Personal interview, 27th June 1996, Tape code IC:PE2:06:96

Evertson, C., Green, J., *Observation as Enquiry and Method*, in M.C. Wittrock (ed.), Handbook of Research on Teaching, pp. 162-213, Manmillan, NY, 1985

Family Expenditure Surveys, HMSO, 1990-98

Faughan, J., *Re-engineering the Corporation*, http://dragon.labmed.umn.edu/, 1996

Faulkner, D., Johnson, G., *The Challenge of Strategic Management*, Kogan Page, London, 1992

Farmer, D., van Amstel, R.P., *Effective Pipeline Management: How to Manage Integrated Logistics*, Gower, London, 1991

Fayol, H., *General and Industrial Management*, (tr. Storrs, C.,) Pitman, 1949

Fernie, J. (ed), *Retail Distribution Management: A Strategic Guide to Developments and Trends*, Kogan Page, 1990

Fernie, J., *Distribution Strategies of European Retailers*, Logistics Information Management, Vol. 6, No. 1, 1993, pp. 24-31

Fernie, J., *Quick Response: An International Perspective*, International Journal of Physical Distribution and Logistics Management, Vol. 24, No. 6, 1994, pp. 38-46

Fiedler, F.E., *A Theory of Leadership Effectiveness*, McGraw-Hill, 1967

Filstead, W. (ed.), *Qualitative methodology*, Markham, NY, 1970

Finberg, H.P.R., *The Agrarian History of England and Wales (Pt. 2)*, Cambridge Univ. Press, Cambridge, 1972

Fisher, J.C., Pry, R.H., *A simple substitution model of technological change*, Technological Forecasting and Social Change, Vol. 3, 1971

Ford, H., *Philosophy of Industry*, Harrap, London, 1929

Forrester, J.W., *Industrial Dynamics*, MIT Press, Cambridge MA, 1961

Fox, B., *KG Retail Sets the Pace*, Chain Store Executive Age, Jan.., No. 67, 1991, pp. 94-97

Frazior, G.L., Sheth, J.N., *An Attitude Behaviour Framework for Distribution Channel Management*, Journal of Marketing, Vol. 49, 1985, pp. 38-48

Freeman, R.E., *Strategic Management: A Stakeholder Approach*, Ballinger Publishing, Boston, Mass, 1984

Friedman, A., *The methodology of positive economics*, in *Essays in Positive Economics*, Univ. Chicago Press, Chicago, ILL, 1953

Fulop, C., *Buying by Voluntary Chains and other Associations of Retailers and Wholesalers*, Allen and Unwin, London, 1962

Galbraith, J.R., *Organisation Design*, Addison Wesley, London, 1977

Gavanagh, B., *Direct Product Profitability - a bridge between the manufacturer and the retailer*, Use of Data, Direct Product Profit and Technology, Spectra Conference Reports, Spectra Services, 1987, pp. 3.1-3.10

General Electric, Retail Perspectives Newsletter, Qtr. 1, 1992

General Electric, Connections Newsletter, Qtr. 1, 1993

General Register Office (Scotland), *Population Statistics*, HMSO, London, 1994

General Register Office (N Ireland), *Population Statistics*, HMSO, London, 1994

de Geus, A., Planning as Learning, HBR, Mar-Apr, 1988, pp. 70-74

Ghauri, P., Gronhaug, K., Kristianslund, I., *Research Methods in Business Studies: A Practical Guide*, Prentice Hall, Hemel Hempstead, 1995

Gill, P., QR Keeps Moving, Stores, Feb. 1991, No. 73, pp 23-24

Goldratt, E.M., Cox, J., *The Goal*, North River Press, NY, 1984

Goldratt, E.M., *The Theory of Constraints*, North River Press, NY, 1984

Goodchild, M.F, *Geographic Information Systems*, Journal of Retailing, Vol. 67, No. 1., 1991, pp. 3-15

Government Actuarial Department., *Population Statistics*, HMSO, London, 1991

Granovetter, M., *Economic action and social structure: the problem of embeddedness*, American Journal of Sociology, Vol. 91, No. 3, 1985, pp. 481-510

Grant, R.M., *The resource based theory of competitive advantage: implications for strategy formulation*, California Management Review, Vol. 33, No. 3, 1991, pp. 114-122

Griener, L.E., *Evolution and Revolution as Organisations Grow*, Harvard Business Review, July / August, 1972, pp. 37-46

Guy, C., *The Retail Development Process: location, property and planning*, Routledge, London, 1994

Hall, R.C., Hitch, C.J., *Price theory and business behaviour*, Oxford Economic Papers, 2, 1939, pp.12-45

Hallsworth, A.G., Wakeman, J., *Tesco and Marks & Spencer: Some Findings on Trading from a Shared Site*, International Journal of Retail & Distribution Management, Vol. 20, No. 4, 1992, pp. 24-27

Hammer, M., Champey, M., *Reengineering the Corporation: A manifesto for business revolution*, Nicolas Brearly, London, 1993

Hammer, M., *Understanding Re-engineering*, http:/www.forscom.army,mil/REENG/G1_Pub.HMTL, 1995

Hammer, M., Stanton, S.A., *The Re-engineering Revolution*, Harper Business, NY, 1995

Hammer, M., Stanton, S.A, *The Reengineering Revolution Handbook*, Harper Collins, London., 1996

Hamel, G., *The Concept of Core Competence*, in Hamel, G., Heeve, A., (eds), *Competence Based Competition*, Wiley, NY, 1994, pp. 11-33

Hamel, G., Prahalad, C.K., *Competing for the Future*, HBS Press, Boston, Mass, 1994

Handy, C., Gow, I., Randlesome, C., Moloney, M., *The Making of Managers*, MSC - NEDO - BIM, London, 1987

Hannan, M.T., Freeman, J., *Organisational Ecology*, Harvard University Press, Boston, Mass., 1988

Harris, D., Personal interview, 22nd March 1997, Tape code TE:DH:03:97

Harris, D., Walters, D., *Retail Operations Management: a strategic approach*, Prentice Hall, Hemel Hempstead, UK, 1992

Harrison, A., *Just-in-Time Perspectives*, Prentice Hall, London, 1992

Hasty, R., Reardon, J., *Retail Management*, McGraw-Hill, NY, 1997

Hayes, R.R., Pisano, G., *Beyond World Class: The New Manufacturing Strategy*, HBR, Jan-Feb, 1994, pp. 77-86

Hayes, R.H., Wheelwright, S.C., *Restoring Our Competitive Edge*, Wiley, NY, 1984

Henderson, B.D., *On Corporate Strategy*, ABT Books, Cambridge, MA, 1979

Herbert, M., *Planning a Research Project: A Guide for Practitioners and Trainees in the Helping Professions*, Cassell, London, 1993

Herzberg, F., Mauser, B., Snyderman, B., *The Motivation to Work*, Wiley, 1959

Hickson, D.J., Hinnings, C.R., Lee, C.A., Schenk, R.E., Pennings, J.M., *A Strategic Contingencies Theory of Intraorganisational Power*, Administrative Science Quarterly, 16/2, 1971, pp. 216-229

Hill, R.M., *Measuring Stock Service Levels*, International Journal of Retail & Distribution Management, Vol. 18, No. 4, 1990, pp. 26-30

Hill, S..R., *The Distribution System*, Pergamon, Oxford, 1966

Hill, T., *Manufacturing Strategy (2nd edn.)*, Macmillan, London, 1993

Hofer, C., Schende, *Strategy Formulation: Analytical concepts*, West Publishing, NYl, 1979

Holland, C., Lockett, G., *IT strategy in retailing: organisational change and future directions*, Journal of Strategic Information Systems, Vol. 1, No. 3, 1992, pp. 134-142

Humphreys, M., *Logistics Management - A Competitive Edge*, Magazine of Manufacturing Performance, Nov. 1988, pp. 30-32

Hyman, R., *Industrial Relations: A Marxist Introduction*, MacMillan, London, 1975

Institute of Grocery Distribution, *Grocery Distribution 1979*, IGD, Letchmore Heath, UK, 1980

Institute of Grocery Distribution, Grocery Distribution 1987, IGD, Letchmore Heath, UK, 1988

Institute of Grocery Distribution, *Retail Distribution Profiles*, IGD, Letchmore Heath, UK, 1993

Jacobson, R., *Unobservable effects and business performance*, Marketing Science, Vol. 9, 1990, pp. 74-85

Jacobson, R., *The 'Austrian' School of Strategy*, Academy of Management Review, Vol. 17, No. 4, 1992, pp. 782-807

Jeffreys, J.B., *The Distribution of Consumer Goods*, Cambridge University Press, Cambridge, UK, 1950

Jeffreys, J.B., *Retail Trading in Britain 1850 - 1950*, Cambridge University Press, Cambridge, UK, 1954, p. 15

Jeuland, A.P., Shugan, S.M., *Coordinating Marketing Channels*, in Gatsuchi, D.A., (ed), Productivity and Efficiency in Distribution Systems, North Holland, NY, 1983

Jemmison, D.B, *Organisational versus environmental sources of influence in strategic decision making*, Strategic Management Journal, Vol. 2., 1981, pp. 77-89

Johnson, G., *Strategic Change and the Management Process*, Blackwell, Oxford, 1987

Johnson, G., (ed, *Business Strategy in Retailing*, Wiley, NY), 1987

Johnson, G., Scholes, K., *Exploring Corporate Strategy (3rd edn)* Prentice Hall, Hemel Hempstead, UK, 1993

Johnson, S.J., *Retail Systems: No Longer Business As Usual*, Journal of Systems Management, Aug. 1992, pp. 8-10 & 34-35

Jones, B.A., *The Story of Halfords*, Halfords (Boots), Redditch, 1982

Jones, P., *Management in Service Industries*, Pitman, London, 1990

Jones, P., *The Parallel Rush*, Informatics, Jan 1994, pp. 47-49

Jorgensen, D.L., *Participant Observation: A Methodology for Human Studies*, Sage, Newbury Park, CA, 1989

Joy, M., *Beginning Unix*, Chapman & Hall, London, 1994

Kaplan, R.S., Norton, R, *The Balanced Score Card - Measures that Drive Performance*, HBR, Vol. 70, Jan-Feb., 1992, pp. 71-79

Kaplan, R.S., Norton, R., *Putting the Balanced Score Card to Work*, HBR, Vol. 71, Sep-Oct, 1993, pp. 134-142

Keegan, J., *The Face of Battle*, Penguin, London, 1978

Kirby, D.A., *The Small Shop in Britain*, Town & Country Planning, Vol. 43, No. 11, 1975, pp. 496-500

Kirby, M.W., Rose, M.B., *Business Enterprise in Modern Britain: From the Eighteenth to the Twentieth Century*, Routledge, London, 1994

Kirkpatric, J., *Grocery Retailing - Where to Next?*, IGD Executive Briefing, IGD, Letchworth, 1994

Klien, J., Edge, G., Kass, T., Skill Based Competition, Journal of General Management, Vol. 16, No. 4, 1991, pp. 1-15

Knee, D., Walters, D., *Strategy in Retailing*, Philip Allen, Oxford, 1985

Kotler, P., *Marketing Management (5th edn)*, Prentice Hall, Englewood Cliffs, NJ, 1995

Krueger, R.A, *Focus groups: A practical guide for applied research*, Sage, Newbury Park, CA., 1988

Lawrence, P.R., Lorsh, J.W., *Organisation and Environment*, Harvard University Press, Boston, Mass., 1967

Lambert, D.M., Bennion, M.L., Taylor, J.C., *Solving Small Order Problems*, Int. JPDMM, Vol. 13, No. 1, 1983, pp. 33-46

Learned, E.C., Christiensen, C., Andrews, K., Guth, W, *Business Policy: Text and Cases*, Irwin, Homewood Ill.., 1969

Lees, R., Worthington, S., *Achieving Above-average Profitability in Retailing*, International Journal of Retailing, Vol. 4, No. 2, 1988, pp. 17-34

Leicester, T., *Squeezing the Supply Chain*, Management Today, March, 1992, pp. 68 - 70

Leonard-Burton, D., *Core capabilities and core rigidities: A paradox in managing new product development*, Strategic Management Journal, No. 13, 1992, pp. 111-125

Leonard-Burton, D, *Wellsprings of Knowledge: Building and Sustaining the Sources of Innovation*, HBS Press, Boston, Mass., 1995

Lloyd, T., *NFC Keeps It's Drive*, Management Today, March, 1993, pp. 45-48

Logothesis, N., *Managing for Total Quality: From Deming to Taguchi and SPC*, Prentice Hall, NY, 1992

Lorsh, J., Allen, S., *Managing Diversity and Interdependence*, Division of Research, Harvard Business School, MA, 1973

McCarthy, W.E.J., *Trade Unions: Selected Readings*, Penguin, Harmandsworth UK, 1972

McClelland, W.G., *The Least Cost Level of Stocks and the Rate of Interest*, Journal of Industrial Economics, No. 8, 1960, pp. 151-171

McCraken, G., The Long Interview, Sage, Newbury Park, CA, 1988

McGoldrick, P., *Cases in Retail Management*, Pitman, London, 1995

McGregor, D., *The Human Side of Enterprise*, McGraw-Hill, NY, 1960

McKinnon, A.C., *The Historical Development of Food Manufacturers Distribution Systems*, Occasional Paper No. 7, Dept. of Geography, University of Leicester, UK, 1981

McKinnon, A.C., *Physical Distribution Systems*, Routledge, London, 1989

McLoughlin, I., Clark, J, *Technological Change at Work (2nd edn.)*, Open University Press, Buckingham, UK., 1994

McMillan, N.H., *EST Retailing: How to Stay Out of the Black Hole*, Information Technology in Retailing, March, 1992, pp. 69-75

Mallen, B., *A Theory of Retailer-Supplier Conflict, Control and Cooperation*, Journal of Retailing, Vol. 39, 1963, pp. 24-32 & 51-52

Marshall, C., *Elites, bureaucrats, ostriches and pusseycats: Managing research in policy settings*, Anthropology and Education Quarterly, Vol. 15, 1984, pp. 235-251

Marshall, C., Rossman, G.B., *Designing Qualitative Research (2nd edn.)*, Sage, Thousand Oaks, CA, 1995

Marting, G., Scharf, A., *Industrialisation and Culture*, Macmillan, London, 1970

Marx, K., *The Conditions of the Working Class in England in 1884*, London, 1887

May, T., *Social Research: Issues, Methods and Process*, Open University Press, Buckingham, UK, 1993

Mayo, E., *The Social Problems of an Industrial Organisation*, Routledge, Kegan & Paul, London, 1949

Meyer, M.H., Utterback, J., *The Product Family and the Dynamics of Core Capabilities*, Sloan Management Review, Spring, 1993

Mills, J., *Competence identification and development methods: Implications from literature and an interim case study*, University of Cambridge, MEG, EPSRC paper., 1996

Marx, K., *Capital (Vol 1 & 2)*, Lawrence & Wishart, London, 1959

Maskell, B., *Performance Mesurement for World Class Manufacturing*, Management Accounting, May-Sept, 1989

Mathias, P., *Retailing Revolution*, Longman, London, 1967

Mathias, P., *The First Industrial Nation: An Economic History of Britain, 1700 - 1914*, Methuen, London, 1993

Mintel, *Grocery Wholesalers*, London, 1979

Mintzberg, H., *Crafting Strategy*, Harvard Business Review, July - August, 1987, pp. 65-75

Mintzberg, H., *Patterns of Strategic Formation*, Management Science, 1987, Vol. 24, No. 9, 1987, pp. 934-948

Mintzberg, H., Walters, J.A., *Of strategies deliberate and emergent*, Strategic Management Journal, Vol. 6., 1989

Mintzberg, H., Quinn, J.B, *The Strategy Process: Concepts, Contexts, Cases*, Prentice Hall, Englewood Cliffs, N.J.., 1991

Mintzberg, H., *The Rise and Fall of Strategic Planning*, Prentice Hall, Hemel Hempstead, UK, 1994

Morgan, C.R., Braganza, A., *BPR your performance measures - not your business: case study evidence for alternative approaches to BPR*, unpublished, 1998

Morgan, D.L., *Focus groups as qualitative research*, Sage, Newbury Park, CA, 1988

Morgan, G, *Creative Organisation Theory: A Resource Book*, Sage, London., 1989

Montagnon, C., Personal interview, 24th September 1993a, Tape code JS:CM1:09:93

Montagnon, C., Personal interview, 8th October 1993b, Tape code JS:CM2:10:93

Nada, A., *Resources, Capabilities and Competences*, Working Paper, HBS, Boston, Mass., 1994

Narrus, J.A., Anderson, J.C., *Distribution and its contributions to partnerships with manufacturers*, Business Horizons, Vol.30, 1987, pp. 34-42

Neely, A.D., Gregory, M.J., Platts, K.W., Richards, H., *Realising Strategy Through Measurement*, IJOPM, Vol. 15, No. 3, 1994

Neely, A., Mills, J.F., Platts, K., Richards, H., Gregory, M., Bourne, M.,, *Developing and testing a process for performance measurement systems design*, in *Manufacturing Strategy and Operations Strategy in a Global Context,* Proceedings of the 3rd EOMA Conference, LBS, June 1996, pp. 471-477

Nelson, R.R., Winter, S.G., *The Evolutionary Theory of Economic Change*, Harvard Univ. Press, Cambridge, MA, 1982

Nielsen, *The Retail Pocket Book*, NTC Publications, Oxford, 1995/1996/1997

Oddy, D., Miller, D., *The Making of the Modern British Diet*, Croom - Holm, London, 1976

Oddy, P., Newman, S., *Speeding up the Supply Chain*, International Journal of Retail & Distribution Management, Vol. 19, No. 5, 1991, pp. 4-6

Office of Population Census and Surveys, *Population Statistics*, HMSO, London, 1994

Ogbonna, E., Wilkinson, B., *Corporate strategy and corporate culture: the management of change in the UK supermarket industry*, Personnel Review, Vol. 17, No. 6, 1988, pp.10-14

Ogbonna, E., *Strategic Changes in UK Grocery Retailing*, Management Decision, Vol. 27, No. 8, 1989, pp. 45-50

Oram, M., Wellins, K.S., *Reengineerings Missing Ingredient*, IPD, London, 1995

Orlicky, J., *Materials Requirement Planning*, McGraw-Hill, New York, 1975

O'Reilly, I., Personal interview, 16th June 1994, Tape code TE:IO1:06:94

Orwin, C.S., *The Open Fields (3rd edn)*, Oxford Univ. Press, Oxford, UK, 1967

Ouroumoff Information Systems, *Head Office Purchasing*, Company Document, 1996

Pascale, R.T., *'Our curious addiction to corporate grand strategy'*, Fortune, 25, January, 1982, pp .15-116

Patton, M.Q., *Qualitative Research and Evaluation Methods (2nd edn.)*, Beverly Hills, CA, 1990

Pearce, M., Stewart, G., *British Political History: 1867 - 1995 (2nd edn)*, Routledge, London, 1996

Pettinger, J., Personal interview, 28th March 1996a, Tape code SN:JP1:03:96

Pettinger, J., Personal interview, 11th April1996b, Tape code SN:JP2:04:96

Pelto, P.J., *The Snowmobile Revolution: Technology and Social Change in the Arctic*, Cummings, Mento Park, CA, 1973

Pelto, P.J., Pelto, G.H., *Anthropological Research: The Structure of Enquiry (2nd edn.)*, Cambridge University Press, NY, 1983

*Penrose, E.T., The Theory of th Growth of the Firm,* Blackwell, Oxford, 1959

Peterof, M., *The Cornerstones of Competitive Advantage: A Resource-Based View*, Strategic Management Journal, Vol. 14, 1993, pp. 171-191

Peters, T.J., *Strategy follows structure: developing distinctive skills*, California Management Journal, Spring, 1984

Pfeffer, J., Salancik, G.R., *The external control of organisations*, Harper & Row, NY, 1978

Philips, M., *The evolution of markets and shops in Britain*, in Benson & Shaw, 1992

Platt, J., *On interviewing one's peers*, British Journal of Sociology, Vol. 32, 1981, pp 75-80

Platts, K.W., Gregory, M.J., *Manufacturing Audit in the Process of Strategy Formulation*, IJOPM, Vol. 10, 1990, No. 9

Plumb, J.H., *England in the Eighteenth Century*, Penguin, London, 1950

Porter, M.E., *How Competitive Forces Shape Strategy*, HBR, Mar-Apr, 1979

Porter, M.E., *Competitive Strategy: Techniques for Analysing Industries and Firms*, Free Press, NY, 1980

Porter, M.E., *Competitive Advantage: Creating and Sustaining Superior Performance*, Free Press, NY, 1985

Porter, M.E., *From Competitive Advantage to Corporate Strategy*, HBR, May-Jun., 1987

Porter, M.E., *Towards a Dynamic Theory of Strategy*, Strategic Management Journal, Vol. 12, 1991, pp. 95-117

Powell, D., *Counter Revolution: The Tesco Story*, Grafton, London, 1991

Prahalad, C.K., Hamel, G., *Strategic Intent*, HBR, May-Jun, 1989, pp. 95-117

Prahalad, C.K., Hamel. G., *The Core Competence of the Corporation*, HBR, May-Jun, 1990, pp. 79-93

Prahalad, C.K., Hamel, G., *Competing for the Future*, HBS Press, Boston, Mass, 1997

Pugh, D.S., Hickson, D.J., *Organisation Structure in its Context: the Aston Programme I*, Gower, Aldershot, 1976

Pugh, D.S., Payne, R.L., *Organisation Structure in its Context: the Aston Programme II*, Gower, Aldershot, 1977

Quinn, J.B., *Strategies for Change: Logical Incrementalism*, Richard D. Irwin, Homewood, Ill., 1980

Rao, K., Young, R.R., *Global Supply Chains: Factors Influencing Outsourcing of Logistics Functions*, International Journal of Physical Distribution and Logistics Management, Vol. 24, No. 6, 1993, pp. 11-19

Randle, O., Personal interview, 10th October 1996, Tape code JS:OR1:10:96

Randle, O., Personal interview, 27th February 1997, Tape code JS:OR:02:97

Ray, D., Millman, D., *Optimal Inventories via Customer Service Objectives*, International Journal of Physical Distribution and Logistics Management, Vol. 9, No. 7, 1979, pp. 323-349

Rees, P., Personal interview, 14th May 1993, Tape code IB:PR1:05:93

Rees, P., Personal interview, 8th June 1994, Tape code IB:PR2:06:94

Reeves, T.K., Woodward, J., *The Study of Managerial Control*, in Woodward, J., (ed), Industrial Organsations: Behaviour and Control, Oxford University Press, London, 1970, pp. 37-56

Reve, T., Stern, W., *International Relationships in Marketing Channels*, Academy of Management Review, Vol. 4, No. 3, 1979, pp. 405-416

Richards, J., MacNearey, B., *Retail Sales Analysis*, IGD, Letchworth Heath, 1991

Robinson, T., Clarke-Hill, C., *Directional Growth by European Retailers*, IJRDM, Vol. 18, No. 5, 1990, pp. 3-14

Robinson, T., Clarke-Hill, C., *International Alliances in European Retailing*, ESRC Seminar on International Retailing, UMIST, Manchester, 1993

Robinson, T., Clarke-Hill, C, *Competitive Advantage Through Strategic Retailing Alliances - a European Perspective*, in Retailing and Service Sciences Conference Procedings, Banf, Alberta, Can.., 1994

Robinson, T., Clarke-Hill, C., *International Alliances in European Retailing*, IRRDCR, Jan., 1995

Robson, A., *Direct Product Profitability - the Unified Approach*, in The Use of Data, DPP and Technology, Spectra Conference Report, 1988, pp. 1-9

Robson, W., *Strategic Management and Information Systems: An Integrated Approach*, Pitman, London, 1994

Robson, C., *Real World Research: A Resource for Social Scientists and Practitioner-Researchers*, Blackwell, Oxford, 1993

Rose, M., *Industrial Behaviour: Research and Control*, Penguin, Harmondsworth, 1988

Rosenberg, L.J., Hirschman, E., *Retailing without stores*, Harvard Business Review, Jul.-Aug., 1980, pp. 103-122

Rothwell, S.G., *Supervisors and New Technology*, in Rhodes, E., Weild, D., (eds), Implementing New Technologies: Choice, Decision and Change in Manufacturing, Blackwell, Oxford, 1984, pp. 374-383

Rumbellow, R., Personal interview, 13th October 1993, Tape code TE:RR:10:93

Sainsbury's plc Published Reports & Accounts 1990 - 1996

Saunders, M, *Strategic Purchasing & Supply Chain Management*, Pitman, London., 1994

Scarborough, H., Corbett, J.M., *Technology and Organsation: Power Meaning and Design*, Routledge, London, 1992

Schary, P.B., *Logistics Distribution: Text and Cases*, Dryden Press, NY, 1984

Schonberger, R.L., *Japanese Manufacturing Techniques: Nine Hidden Lessons in Simplicity*, Free Press, NY, 1982

Schonberger, R.L., *World Class Manufacturing Casebook: Implementing JIT and TQC*, Free Press, NY, 1986

Schumpeter, J.A., *The Theory of Economic Development*, HUP, Cambridge, Mass, 1934

Scott-Morton, M., (ed.), *The Corporation of the 1990's: Information Technology and Organisational Transformation*, Oxford University Press, NY, 1994

Sekaran, U., *Research Methods for Business: A Skill Building Approach*, Wiley, NY, 1992

Shaw, G., *The evolution and impact of large scale retailing in Britain*, in Benson & Shaw, 1992

Shirley, R.C., Peters, M.H., El Ansary, A., *Strategy Policy Formulation: a Multifuntional Orientation*, Wiley, NY, 1981

Sigsworth, E.M., *Montague Burton: the Tailor of Taste*, Manchester University Press, Manchester, 1990

Silverman, D., *The Theory of Organsations*, Heinemann, London, 1970

Simon, H.A., *Administrative Behaviour (2nd edn.)*, Macmillan, London, 1960

Slack, N., Chambers, S., Harland, C., Harrison, A., Johnston, R., *Operations Management*, Pitman, London, 1995

Sloan, A.P., *My Years With General Motors*, Sedgewick & Jackson, London, 1963

Smith, A., *Inquiry into the Nature and Causes of The Wealth of Nations (Vol. 1 & 2)*, New York, 1776

Social Trends, HMSO, London, 1985-1996

Spradley, J.S., *The ethnographic interview*, Holt, Reinhart & Winston, NY, 1979

Spradley, J.S., *Participant Observation*, Holt, Reinhart & Winston, NY, 1980

Stacey, N.A.H., Wilson, A., *The Changing Pattern of Distribution*, Business Publications, London, 1958

Stalk, G., Hout, T.M., *How Time Based Management Measures Performance*, Planning Review, Nov-Dec, 1990, pp. 26-29

Stalk, G., Evans, P.S., Schulmann, L., *Competing on Capabilities: the New Rules of Corporate Strategy*, HBR, Mar-Apr, 1992, pp. 57-69

Stern, L.W., El-Ansary, A.I., *Marketing Channels*, Prentice Hall, Englewood Cliffs NJ, 1992

Stewart, I., Personal interview, 20th May 1993, Tape code SN:IS1:05:93

Stewart, I., Personal interview, 22nd March 1996, Tape code SN:IS2:03:96

Stewart, W., *Physical Distribution: Key to Improved Volumes and Profit*, Journal of Marketing, Vol. 29, 1965, pp. 65-70

Strauss, A., Corbin, J., *Basics of Qualitative Research: Grounded Theory Procedures and Techniques*, Sage, Newbury Park, CA, 1990

Stewart, V., Stewart, A., *Business Applications of Repertory Grid*, McGraw-Hill, London, 1981

Swanston, C., Personal interview, 24th June 1994, Tape code JS:CS1:06:94

Swedberg, R., Himmelstrand, W., Brulin, G., *The paradigm of economic sociology, Theory and Society*, 16 (2), 1987, pp. 169 - 213

Sykes, J.B., *The Concise Oxford Dictionary of Current English*, Clarendon Press, Oxford, 1978

Tafti, M.H.A., Nikbakht, E, *Neural Networks and Expert Systems: New Horizons in Business Finance Applications*, Information Management & Computer Security, Vol. 1, No. 1., 1993, pp. 22-28

Tannenbaum, A.S., *Control in Organisations*, McGraw-Hill, NY, 1968

Targowski, A., *The Architecture and Planning of Enterprise-Wide Information Management Systems*, Idea Group Publishing, Pennsylvania, 1990

Taylor, F.W., *Scientific Management*, Harper, N.Y. & London, 1947, pp 79-85

Taylor, S.J., Bogden, R., *Introduction to Qualitative Research: The Search for Meaning (2nd edn.)*, John Wiley, NY, 1984

Teece, D.J., *Technological Change and the Nature of the Firm*, in Dosi, G., (ed) Technical Change and Economic Theory, Pinter, London, 1988

Tesco plc Report & Accounts 1990 - 1996

Thomas, G., *Store cards - changing role and opportunities*, The Treasurer, Sept. 1993, pp 50-52

Thompson, K., *The Serpent in the Supermarket's Paradise*, European Management Journal, Vol. 10, No. 1, 1992, pp. 112-118

Thorpe, D., Shepherd, P.M., *Some Aspects of Economies of Scale in Food Retailing with Special Reference to Two Superstores*, Research Report No. 26, RORU, Manchester Business School, 1977

Tighe, G., *Open Road*, Informatics, Nov. 1992, pp. 43-45

de Tocqueville, 1835, *Journeys to England and Ireland*, Translated by Lawrence, G., Mayer, K., Mayer J.P., in Harvie, C., Martin, G., Scharf, A., 1970, *Industrialisation and Culture*, Open University Press, pp 40-42

de Toni, A., Nassimbeni, G., Tonchia, S., *New Trends in the Supply Environment, Logistics Information Management*, Vol. 7, No. 4, 1994, pp. 41 - 50

Townsend, R.A., *Spacial aspects of the growth of part-time employment in Britain*, Regional Studies Vol. 20, 1986, pp. 313-330

Trice, H.M., Beyer, J.M., *The concept of charisma*, Research in Organisational Behaviour, Vol. 8, 1986, pp. 118-164

Tripp, D.H., *Co-authorship and negotiation: The interview as an act of creation*, Interchange, Vol. 14, 1983, pp. 32-45

Trist, E.L., *The Socio-technical Perspective* in van Ven, A., Joyce, W.F., (eds), Perspectives on Organisation Design and Behaviour, Wiley-Interscience, NY, 1981

Twiss, B.C, *Managing Technical Innovation (3rd edn.)*, Pitman, London., 1986

Twiss, B.C., Goodridge, M., *Managing Technology for Competitive Advantage*, Pitman, London, 1989

Urry, J., Wakeford, J., *Power in Britain: Sociological Readings*, Heinemann, London, 1973

Van Manen, M., *Researching lived experience: Human science for an action pedagogy*, SUNY Press, Buffalo, 1990

Vanguard Education Team, *Value Added and Data Services*, International Journal of Information Resource Management, Vol. 1, No. 2, 1990, pp 28 - 36

Vickery, S.K., *A Theory of Production Competence Revisited*, Decision Sciences, Vol. 22, 1991, pp. 635-643

Voss, C., Armistead, C.G., Johnston, B., Morris, B., *Operations Management in Service Industries and the Public Sector*, Wiley, Chichester, 1991

Vroom, V.H., Yetton, P.W., *Leadership and Decision Making*, University of Pittburgh Press, 1973

Walker, M., *Quick Response: The Road to Lean Logistics*, in Cooper, J., Logistics and Distribution Planning, Kogan Page, London, 1994

Walters, D., *Features of Physical Distribution in the Food Industry*, Saxon House, Farnborough, 1976

Walters, D., *Strategic Retailing Management: A case study approach*, Prentice Hall, London, 1988

Walters, D., *Retail Management: Analysis, Planning and Control*, Macmillan Press, London, 1994

Warman, J., *Warehouse Management*, Heinemann, London, 1971

Warnes, A.M., *Social problems of elderly people in cities*. In - Herbert, D.T., Smith, D.M., (eds), Social Problems and the City, Oxford University Press, Oxford, 1989, pp.197-212

Waterson, M.J., *Marketing Pocket Book*, NTC, Henley on Thames, 1989 - 1996

Waugh, A., *The Lipton Story*, Cassell, London, 1951

Weaver, P.L., *Practical SSADM Version 4*, Pitman, London, 1997

Weber, M., *The Protestant Ethic and the Spirit of Capitalism*, Allen & Unwin, NY, 1930

Weber, M., *The Theory of Social and Economic Organisations*, Free Press, NY

Weinstein, S., *How Do US Supermarkets Rate*?, Progressive Grocer, 1991, August, Vol. 70, 1947, pp. 77-78

Wernerfelt, B., *A Resonance Based View of the Firm*, Strategic Management Journal, No. 5, 1984, pp. 171-180

Whitelock, D., *The Beginning of English Society*, Penguin, London, 1991

Whiteoak, P., *The Realities of Quick Response in the Grocery Sector*, International Journal of Physical Distribution and Logistics Management, Vol. 24, No. 10, 1994, pp. 33-39

Whittington, R., *Putting Giddens into action: social systems and managerial agency*, Journal of Management Studies, Vol. 29, No. 6, 1992, pp. 693-712

Whittington, R., *What is Strategy - and does it matter?*, Routledge, London, 1994

Wild, M.T., Shaw, G., *Trends in Urban Retailing: the British experience during the nineteenth century*, Tijdschrift voor Economisch en Sociale Geographie, Vol. 70, 1979, pp. 35-44

Wild, R., (ed), *Technology and Management*, Cassell, 1990

Wilkinson, B., *The Shop Floor Politics of New Technology*, Heinemann, London, 1983

Wilkinson, R., Personal interview, 23rd June 1994, Tape code IC:RW1:06:94

Williams, B., *The Best Butter in the World*, Ebury Press, London, 1995

Williams, J., *Food Distribution Cosats: Results of an Inter-firm Study of Wholesale Transport and Warehousing Costs*, National Materials Handling Centre, Cranfield, 1975

Williamson, O.E., *Strategizing, economizing and economic organizations*, Strategic Management Journal, 12, 1991, pp. 75-94

Wilsher, P., *Whose Hands on the Housekeeping?*, Management Today, December, 1993, pp. 38-43

Winch, M., Personal interview, 25th February 1993, Tape code SA:MW1:02:93

Winch, M., Personal interview, 2nd June 1995, Tape code SA:MW2:06:95

Winch, M., Personal interview, 19th September 1996, Tape code SA:MW3:09:96

Winch, M., Personal interview, 27th March 1997, Tape code SA:MW4:03:97

Winstanley, M.J., *The Shopkeepers World: 1830-1914*, Manchester University Press, Manchester, UK, 1983

Wodweden, J., *Retailing Overview 1996*, IGD, Letchworth, 1996

Wolcott, H.F., *On ethnographic intent*, Education Administration Quarterly, Vol. 3, 1985, pp. 187-203

Wood, A., *Efficient Consumer Response*, Logistics Information Management, Vol. 6, No. 4, 1993, pp. 38-40

Woodward, J., *'Management and Technology', Problems of Progress in Industry*, Vol. 3, HMSO, 1958

Woodward, J., *Industrial Organsations: Theory and Practice*, Oxford University Press, London, 1965

Wrigley, P., *EDI and Retail Operations*, Journal of Strategic Information Systems, Vol. 2, No. 3, 1993, pp. 23-29

Yavitz, B., Newman, W.H., *Strategy in Action*, Free Press, NY, 1982